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## EDITORIAL ANNOUNCEMENTS

*THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages and all of the advertisement pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Transport and Railroad Gazette.*

*CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.*

*ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

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The Springfield *Republican* says that "the proposal, embodied in the Hepburn bill and insisted upon by the railroads if they must put up with new legislation, is to make the United States courts the larger factor in applying public control of rates." Continuing, the editor says:

"Does this proposal grow out of a sincere belief that a federal judge is more competent fairly to pass upon what are and what are not reasonable rates, than a commission giving its whole time to the subject; or does it rest upon the impression that the federal judges will prove more amenable to the railroad influence and interest? It certainly cannot be founded on a belief in the superior competency of men who are giving their attention chiefly to questions wholly foreign to those of railroad rates. There is no sense whatever in the view that federal judges are infallible, while every other tribunal of government is subject to the limitations of human nature."

It may well be that the alleged railroad proposal does not rest on either one of the two suggested theories. Other things being equal, it is obvious that a commission devoting its time to rate-making would be more competent than one engaged a part of the time in law questions connected with non-railroad matters; but other things are not equal. The first qualification in a man who is to decide a rate-question, or any other public controversy, is an impartial mind; but the Interstate Commerce Commission has been accused—and not alone by railroad men—of being conspicuously deficient in this respect. This accusation may have been aimed more particularly at one or two commissioners; but if the other three or four are so complaisant as to be nonentities, the defect is the same as though it existed in every member. A railroad officer who desires to make a judge lean toward the railroad side of a case is wrong-minded; but in his efforts in that direction he has, just now, the co-operation of many right-minded persons; for many such believe that the judge in question—i.e., the commission—leans too far away from the railroad side. It is not necessary to assume that the judges of the Federal courts are looked upon as infallible, in order to explain the sentiment of railroad people in their favor. They are all fallible men. But insofar as infallibility can be imparted from without, the people of this and other enlightened countries have endeavored to impart it to the judges of their higher courts; while in the case of the Interstate Commerce Commission one of the most important of such outside measures—life tenure of office—has been omitted. The appointing power has also almost invariably ignored railroad experience, which is another grave defect. The commissioners may "give their whole time to the subject"; but that may be insufficient. In other matters of similar importance we usually try to find men who have given their whole lives to the subject.

In the discussion by the Western Railway Club of the necessary qualities for a successful fireman, brains were properly given precedence over muscle. The man capable of shoveling the largest amount of coal into the fire-box with the least degree of physical exhaustion may be, even on the largest locomotive, a much inferior fireman to the less muscular man who "uses his head" in his work. It was related of one master mechanic that he held great physical strength in firemen at a discount, giving as a reason that the weaker men were not so apt to put too much coal into the fire-box. That the man who has a knowledge of combustion, and of the principles of the machine he is firing, will have a distinct advantage over the one who, though excelling him in brute strength, lacks this knowledge, needs no argument. Yet, it has been said by men who are in a position to know, that a large percentage of enginemen, as well as firemen throughout the country, lack the knowledge of fuel and of what occurs within the fire-box that is essential to intelligent firing. The paper of Mr. Pratt, printed this week, expresses the belief that the time will soon come when leading railroads will demand a knowledge of combustion and the theory of firing, and will examine applicants on these subjects before employing them. Already, some roads employ fuel inspectors, whose duties include the instruction of the firemen in regard to fuel and its economical combustion. With the knowledge that the cost of the fuel forms 30 to 40 per cent. of the cost of running the engine, the importance of the saving in expense possible from a reduction of wasteful firing will be the more fully appreciated. Or, to quote Mr. F. P. Roesch's original remark on this point, the place to begin saving coal is "at the wooden end of the scoop," rather than in refinements of design, mechanical appliances, etc. It is noticeable that there was almost no reference to automatic stokers in the discussion, although the contention was made that there are simple labor-saving devices, such as fire-door openers, the use of which is a very material help to the fireman enabling him to fire to better advantage, and which should therefore be helpful in relieving present conditions.

## INCREASING THE NET PROFIT OF PASSENGER TRAFFIC.

In view of the tremendous gains of recent years in the economy with which freight is moved, it is noteworthy that in handling passenger traffic the tendency has been the other way. Magnificent terminal stations, luxurious trains and fast schedules, once viewed as extraordinary inducements, have come to be demanded as a matter of course, so that they have less and less of the advertising value which has been claimed for them. This is particularly true in heavy suburban traffic, where congestion at the terminal and extremely low commutation fares leave a very narrow margin of profit over cost; a margin so small that terminal enlargements in great cities, to permit of increased suburban service, are often undertaken rather on account of the building up of the territory, with the resultant long haul traffic, than in the hope of making better net profits from the suburban business itself.

The last meeting of the New York Railroad Club, an account of which was printed in the *Railroad Gazette* Jan. 27, was devoted to the consideration of two radical methods of increasing the net profits of passenger business, one of these methods, electrification, finding its field where traffic is very dense, and the other, rail motor cars, where

traffic is very light. Electrification has not yet been seriously proposed for any applications outside of suburban traffic or special cases such as the Pennsylvania and New York Central terminal projects, where the use of steam locomotives is out of the question. The conditions of density and traffic distribution which are favorable for electric traction are at present confined to this suburban business. Rail motor cars, on the other hand, are being experimented with on branch lines and certain portions of main lines where the local traffic is light but where the demand for transportation is frequent, or where parallel trolley lines, by reason of lower fares and better service, create sharp competition. It is obvious that between these two extremes there is a vast field, embracing most of the existing mileage in the United States, where steam locomotives are, and will apparently continue to be, the most economical motive power for many years to come.

The electrification of an existing steam road involves many problems entirely outside of the engineering difficulties, and the cost of the electric power-house, transmission line and rolling stock equipment is only a small part of the expense which must be incurred. At the meeting referred to, Mr. W. J. Wilgus estimated it at about a quarter of the total. Assuming that the traffic is dense enough to justify the change from steam to electricity, then if the electric zone be of large enough radius to require through express service from outlying points, a separation of express and local trains on different tracks is absolutely necessary. Grade crossings cannot be allowed to exist, and greater care must be taken along the entire right-of-way to protect the line from trespassers, where an exposed third-rail is used. The interest on the cost of making these changes in the permanent way, when added to the cost of electrical equipment, is a large additional burden, to be offset partly by an increase in net earnings per passenger, due to more efficient operation, and partly by an increase in the number of passengers carried. The electric interurban roads have shown how a frequent and convenient service can create new business.

Rail motor cars, on the other hand, are a far less costly experiment. Practically no changes in the permanent way or terminal and station facilities are necessary, and the cost of three motor cars is but little more than that of an engine and three coaches. One man in the train crew is done away with (if the labor unions can be placated), and there are no men in the power-house or sub-station to compensate for this reduction in the working force. For such lines as rail motor cars are best adapted, no separation of traffic is necessary, and a single track can be operated almost as well as two tracks. On a line, say, 25 miles long, three motor cars can give an hourly service in both directions, whereas a steam train of equivalent seating capacity could give a service of only one train in three hours, and with the frequent stops could make little or no better time than the motor cars. In this country, a very useful field for the rail motor car, apart from branch line working, would be on sections of the trunk lines where important towns are from 25 to 50 miles apart and where the intermediate towns now have a local service of only one or two trains a day each way. The combined through and local passenger and freight traffic does not, and will not for many years to come, justify the electrification of such lines, but a good local train service between the small towns and the important cities should bring about a profitable development of the intervening country.

There are many indications that the time is surely coming when the uses of electrification, especially for passenger service, will be very greatly extended. For the present it is only being called upon to increase the profits from passenger working where there is great congestion of short haul traffic. The courageous work now being done by the New York Central and the Long Island looks far ahead to the years when greater gross earnings and more efficient working together will be able to take care of the first cost, but there can be scarcely a doubt that that time will come, bringing with it great rewards.

## "LET JUSTICE BE DONE."

It is more than a decade since a great and wise railroad president, now deceased, appealed to the public, in a paper bearing the above title, to deal fairly and justly with the railroad industry. He urged that if there is no alternative save oppressive legislation on the one hand and government ownership upon the other, simple justice to the investors in railroad property demands that these properties be taken over by the government at a fair valuation. Long ago the advocates of drastic anti-railroad laws, adopting an argument similar to that by which reluctant children are urged to swallow nauseous medicines, which may or may not have been wisely prescribed, began to use the bugaboo of government ownership to frighten conservative citizens into acceptance of their legislative nostrums. Thus Prof. Henry C. Adams, statistician to the Interstate Commerce Commission, writing in 1896, said:

> There are two possible lines of development, both of which call for an extension of governmental authority. The one is to increase the powers conferred upon commissions, so that they may become in fact, as they now are in theory, a positive influence in the conduct of railroad affairs; the other is to adopt the policy of government ownership and government management.

It is gratifying to note that although the President regards "increased supervision" as the "only alternative to an increase of the present evils on the one hand or a still more radical policy on the other," his experienced Secretary of the Navy, fresh from daily and practical contact with the business of transportation and the patrons of a great railroad system, sees at least two other possibilities, both of which lie in the direction of greater rather than less freedom on the part of the individuals and corporations engaged in this great industry. But if it is to be a choice between the evils of government control without ownership and government ownership and control, which should railroad investors choose? It is not particularly pleasant to discuss this or any other American problem from the point of view of class interest, but when a threat is hurled at one industry such discussion may be justified. And the railroad class is a large one. Primarily, it consists of one and one-half millions of workers whose names are borne upon railroad pay-rolls and of other millions who build cars, make rails, mine locomotive fuel, raise grain to feed railroad labor, and follow the thousand and one vocations which contribute to the sustenance of this great industry. Then there are the millions of depositors in savings banks that own railroad securities, the policy holders of insurance companies whose capital and reserve funds are similarly invested, the students and other beneficiaries of universities and other institutions whose endowments and trust funds rest upon railroad stocks and bonds. To this great and worthy class the enactment of the Quarles-Cooper bill, or the Hearst bill, or the Townsend bill, or the Hepburn bill, or the Davey bill, or any other rate-making measure means that the industry upon which its members depend shall be confined in legislative swaddling-clothes. When any of these measures has become a law, elasticity of railroad rates will have become a thing of the past. Facility in adopting rates to the changing demands of an intensely dynamic industrial organization will be no more, although such facility is precisely the means by which American industry and American railroads have grown great together. The rates and the revenues of every railroad system will be hopelessly at the mercy of a Federal board, whose members are selected as partisans and may be chosen for political reasons. It will no longer be safe to make empirical concessions in the hope of augmenting traffic at particular points or of particular kinds, for every reduction will be a club by which the ultimate authority, that is, the Interstate Commerce Commission or whatever board may take its place, could and probably would compel other and undesirable reductions. The effect upon the railroads would be no worse than that upon all other industries, but we are now considering the subject solely from a railroad point of view. Government rate-making, whether under government ownership or under control not based upon ownership would stretch all American industry, including the railroad industry, upon a procrustean bed and could cause nothing but numbness, stagnation and deformity.

Does not this make the sensible choice of the railroad class perfectly clear? Under government rate-making and private ownership they would bear the first consequences of the blow. With this alternative, railroad labor and railroad capital would suffer first and most acutely. Government ownership would enable the present railroad class either entirely to "stand from under" or at the worst but to bear their proportionate share of the aggregate evil inflicted upon the community. The worst evil of government ownership would in fact be precisely that now sought to be imposed, viz., government rate-making. If the railroads were owned by the government, railroad employees could hope to maintain, for a time at least, their present high relative standard of earnings, by means of united political action. Ultimate reduction would probably be necessary in consequence of reduced efficiency in management, but this would probably be long postponed. The savings banks, insurance companies, colleges, missionary societies, etc., as well as the private owners of railroad securities would fare still better.

But when government ownership is brought about, if it ever is, it will not be, for it cannot be, by the confiscation of property. If railroad property is taken for pub-

lic use, those from whom it is taken must be given fair compensation therefor. There is but one way to meet this constitutional requirement and that is to issue to them government bonds to the full value of their holdings in railroad securities. When they have been so compensated they need worry no longer concerning the future of the American railroad system. If the rates made by the government officers charged with that duty and the methods of operation adopted by government functionaries do not leave a sufficient balance, after paying wages and other costs of operation, to meet the interest on the bonds issued to pay for the railroads, Congress will have to impose a general tax sufficient to meet the deficit. And why not? If the railroads are to be run by the government, that is by the politicians, it is clear that the people who order the change, must pay the cost. It cannot fall directly upon a class which is powerless to prevent a change which its leaders have consistently advised against. "Let justice be done." By all means, Mr. President, if government ownership is the only alternative to legislative spoliation, let us have government ownership—provided the government is willing to pay the cost! At any rate, when that proposition is brought forward, the people will know just what they have to meet and will be ready to meet it.

The committee on interstate and foreign commerce of the lower House of Congress—the Hepburn committee—on Tuesday of this week prepared a new rate regulation bill, throwing aside those of Messrs. Hepburn, Esch, Townsend and Davey heretofore published; and the Republican members of the committee expressed the hope of getting their new bill passed by the House this week. It is evident that some of the members of the committee have been in constant conference with President Roosevelt, and there appears to be a general disposition to try to secure action by Congress at the present session. The new bill increases the Interstate Commerce Commission from five members to seven and creates a court of transportation. The commission is to have power to declare what shall be a reasonable rate, in place of a rate found unjust, and such new rate shall become operative in 30 days. Thirty days more is allowed for an appeal to the court of transportation. The court will review these cases sitting as a court of equity. The commission may apportion joint rates if the carriers do not. The proceedings before the commission, including the evidence, shall be sent to the court of transportation within ten days after notice. Proceedings before the court are to be conducted by the attorney general, but the commission may, with his approval, employ special counsel. Violation of an order of the commission subjects the carrier to $5,000 fine for each day. The President is to appoint two additional commissioners and the salaries of the seven shall be $10,000 each. The court of transportation is to be composed of five circuit judges, no two from the same circuit, and each appointed for five years. The court shall hold four regular sessions in Washington each year and special sessions elsewhere. The President is to appoint five additional circuit court judges. The findings of fact made by the commission shall be received as *prima facie* evidence in the court, and no new evidence shall be admitted before the court if by proper diligence it could have been brought before the commission. Appeals from the court of transportation to the Supreme Court of the United States must be taken within 30 days; the Supreme Court shall give these appeals precedence over all cases except criminal cases.

Some eight months ago (May 27, 1904) we pointed out the new and somewhat unique set of problems imposed on state railroad commissions by the street railways—assuming what may almost be considered axiomatic, that the rest of the country will follow the New England precedent and put both steam and electric lines under single commissions. Massachusetts now furnishes a striking example of these new complications: The New Haven Company has just bought up the Berkshire street railway, a long competing "cross country" line. The steam company will naturally want to transfer to its "holding" organization, the "Consolidated Railway" corporation, the acquired property. But unlike the street railways acquired by the New Haven at and near Worcester, the Berkshire has absolutely no physical connection with the Consolidated Railway system and does not even touch the Connecticut state line. Corporatively and geographically it is a separate entity and, as respects holding companies, the fixed policy of Massachusetts has been the segregation of acquired lines and treatment of the holding company as an individual stockholder. It looks now, however, as though the policy would be modified, at least as regards the steam companies. For the Massachusetts commission, whose sayso usually "goes" with the state legislature, points out the tendency of those corporations to absorb electric roads, and, in approval of it, cites (1) the trained judgment and larger re- and (2) harmony of operation in focusing sources that it brings to the electric lines, and distributing passenger traffic. The commission even goes farther and adds that, to secure the best public service "it is by no means clear that . . . it is at all essential that the competitive conflict (of steam and trolley) should be prolonged" and "a review by the legislature of the reasons for the present character of our laws upon this subject would seem to be timely." All this suggests, in an example localized to Massachusetts, the many new enigmas in steam-trolley relations which state commissions are fronting. They involve questions of merger, operation, layout, fares, returns, new capitalization, and, in fact, almost the whole range of railroad and railway questions raised in duplex steam-trolley phases. And, beyond the wider question of policies, is the considerable mass of new legislation—some of it empirical—needed to make those policies effective.

On January 30 the Supreme Court granted the application of E. H. Harriman and others, for a writ of certiorari to review the decision of the Circuit Court of Appeals in favor of the Northern Securities Company, and assigned the case for hearing on February 20. The lower court had granted an order restraining the pro rata distribution of the shares of the Great Northern and Northern Pacific railroads held by the Northern Securities Company. The Circuit Court of Appeals dismissed this injunction and the present decision means that the Supreme Court will take up the entire record of the courts below, and that the case will likewise be argued on its merits before the Supreme Court on the day set. The contention turns on the old question as to whether control of the Northern Pacific shall rest with the Harriman interest by virtue of a return of the exact shares which they turned in to form the Northern Securities Company, or whether this control will pass to Mr. Hill by virtue of a pro rata distribution of Northern Securities assets, which would give Mr. Harriman a considerable minority holding of Great Northern stock which he did not have before and does not particularly want, but would deprive him of the majority holding of the Northern Pacific with which he went into the holding company.

On this same day, January 30, the Supreme Court also handed down a very interesting decision with regard to the so-called beef trust, holding it to be a combination in restraint of trade and commerce in violation of the Sherman anti-trust law. The injunction issued last spring by Judge Grosscup restraining the members of the so-called trust from conspiring to depress the price of cattle and to raise the price of dressed beef was affirmed, with certain slight modifications. The opinion was delivered from a united bench, and is noteworthy for its disregard of technicalities and the evidence which it furnishes that the Supreme bench means to interpret the Sherman law in accordance with the spirit and not with the letter of the requirements, in the many places where the spirit and the letter conflict. Judge Holmes, in delivering the opinion of the court, said that intent was almost essential to a combination in restraint of commerce among the states, and that it was essential to an attempt to monopolize commerce among the states. "Where acts are not sufficient in themselves to produce a result which the law seeks to prevent, for instance, the monopoly; but require further acts in addition to the mere forces of nature to bring that result to pass, an intent to bring it to pass is necessary in order to produce a dangerous probability that it will happen. But when that intent, and the consequent dangerous probability, exists, this statute, like many others, and like the common law in some cases, directs itself against the dangerous probability as well as against the completed result."

The experiment of three cent fares within a certain zone, now being tried by the street railways in Cleveland, is not to be taken seriously as evidence of any impending change in street car fares. Cleveland is the scene of ex-Mayor Tom Johnson's activities, and the traction people, in the present interval of calm, are probably glad to be able to collect some colorless and dispassioned evidence as to the practical working of a three cent fare. It is easy to see that data thus collected might be of use in another radical campaign. From an operating standpoint, street railway managers are skeptical of the advantages gained from offering reduced rates on city lines, where there is no interurban complication. Where six tickets are sold for 25 cents, on purely local street railway systems, it is not apparent that the sales are in any way increased; the extra ticket amounts to little more than a gift to the public. The inducement to ride at a slightly lower fare does not create nearly enough new business to offset the cost, and it has been proved in several localities that the extra five cents on every sixth ticket made the difference between profit and loss for the whole street railway system.

## NEW PUBLICATIONS.

*Cyclopedia of Applied Electricity.* Prepared by a corps of experts, electrical engineers and designers for the American School of Correspondence at Armour School of Technology. Chicago, 1905. Five vols. Size 8 x 10. Illustrated. Three-quarters red leather binding. List price $30. Special introductory price $18.

This work, which is most comprehensive, covering the entire field of commercial and

industrial applications of electricity, is prepared primarily for the use of practical men of limited technical education and for engineering students. But although it is not addressed to the technically educated specialist, this class will find it a valuable addition to their libraries, as they will find therein a treatment of the latest developments and applications of electricity, written by specialists, many of them well-known, such as Prof. F. B. Crocker, of Columbia University; Prof. Wm. Esty, of Lehigh University; Prof. D. C. Jackson and Prof. Geo. C. Shaad, of the University of Wisconsin, and Prof. Louis Derr, of Massachusetts Institute of Technology. In view of the purpose for which it was prepared, all subjects are dealt with in the simplest, most direct way possible, higher mathematics being omitted entirely. The work is divided into five parts or volumes. Because of the great scope of the work it will be possible here to indicate only briefly the subjects dealt with in each volume and the manner of treatment.

Part I deals with the elements of electricity, the electric current, electrical measurements, electric wiring, the electric telegraph, wireless telegraph, the telautograph, insulators, and electric welding. The first three subjects are covered in a clear, concise manner, grounding the student in the fundamentals. The section on electric wiring includes also the installation of electrical apparatus. Both subjects are covered in good practical shape, and rules for the care and operation of apparatus and for outside wiring and construction work on pole lines, also tables and diagrams, are given. The section on the electric telegraph covers the subject quite fully, enabling the beginner to get a good working knowledge of apparatus and methods, instructing him in the use of the key and giving charts from which the relative time values of the elements which go to make up the signals may be learned. The interesting chapter on wireless telegraphy was prepared by Mr. A. Frederick Collins, author of the well-known work on that subject, and sets forth in plain language the underlying theory and the methods by which this somewhat mysterious means of communication is effected. The chapter on the telautograph is a reprint of Mr. Jas. Dixon's paper read at the October, 1904, meeting of the American Institute of Electrical Engineers. The remainder of the volume is given up to short chapters on insulators for transmission lines and electric welding.

In Part II, dynamos, motors and storage batteries form the subject matter. In the first section the theory of dynamo-electric machinery and the principles underlying its design are explained and the three types of dynamos briefly described. The kind and nature of the various losses occurring in different parts of these machines are given, with calculations of their amount, and also of electromotive force. Following this is a chapter on direct-current dynamos, treating of the three important types more in detail and their principal parts considered separately. Calculations for designing a 50-k.w. bi-polar shunt machine are given, only the electric and magnetic parts being covered. The next chapter illustrates and describes various types of dynamo-electric machinery made in this country, showing methods of driving. Direct-current motors are also included in this section. The wide use of motors in industrial and manufacturing establishments has produced a diversity of designs and numerous representative applications are described and illustrated, including motor-driven tools, cranes, printing presses, etc. Brief space is given to motor-generators and dynamotors, including boosters. A discussion of motor theory and principles follows, in a separate chapter, which closes with a reprint of the paper on Electric Motors in Machine Shop Service read at the International Electrical Congress at St. Louis by Mr. Charles Day. The section on Storage Batteries occupies 63 pages, giving, besides the theoretical treatment and instructions for care and testing, their applications in different classes of electrical work.

Part III. opens with electric lighting. The incandescent lamp, as the most commonly-used type, has the method of manufacture described in detail, and information is included on its efficiency, life and illuminating power. Different arc lamp mechanisms are next described, and there is a section on special types like the Nernst, osmium and mercury vapor lamps. Power distribution, illumination, the lighting of residences, public halls, offices, streets, etc., shades and reflectors, and photometry are all treated in a clear and practical manner, the section concluding with a special chapter on shop lighting. The next section is devoted to electric railways, the first chapter being on car equipment. This is subdivided into motors, controllers, heaters, wiring, resistances, accessories and trucks. The multiple-unit system of control is treated under "controllers," and brake systems under "trucks." Overhead, third-rail and conduit systems of current supply are described in detail, following which track construction, electrolysis and power supply and distribution are taken up in order. Alternating current systems are briefly dealt with, there being short paragraphs on single-phase and three-phase motors and a discussion of alternating current motor advantages. Chapters on "operation" and "testing for faults" conclude the section.

Management of Dynamo Electric Machinery is treated in the next section, the endeavor being to set forth the most important features to be considered in handling and operating electric generators and motors. The subject is divided into three parts: (a) selection, erection, connection and operation; (b) inspection and testing; (c) troubles or "diseases," and remedies. The final section is on power stations, dealing with their design, location, operation and maintenance, with special chapters on "central station engineering," covering the practice in this country for the past quarter of a century, and on "a graphical method of recording data of boiler trials."

Part IV. is a treatise on alternating currents and alternating current machinery. Alternating current theory, harder to comprehend than direct current theory, is stated as simply and directly as possible, and difficult matematical demonstrations avoided. Measuring instruments are described and armature winding for different phase machines are explained by text and diagram. Commercial types of alternators are then taken up in detail, followed by a section on synchronous motors and transformers. The subjects of the remaining sections are: The rotary converter; the induction motor; switchboard and station appliances; power transmission; mercury vapor converter, the latter being the Hewitt apparatus. A study of this volume will yield a good working knowledge of this newer, less well-known and less easily understood branch of electrical science.

Part V., also, deals with but one general subject—telephony. It is divided into nine parts, covering instruments, lines, exchanges, battery systems, operation, telephone systems, maintenance, the automatic telephone and wireless telephony. The amount of space given this subject is indicative of its importance in practically all branches of present day life, and particularly in commercial life. The treatise is of value alike to the beginner and the advanced student, to the thoretical and the practical man, to the man engaged in the most complicated city telephone work and to the builder of rural exchanges and farmers' lines. The parts on the automatic telephone and wireless telephony treat briefly but interestingly of these newest branches of the art.

The books are designed primarily for text books and therefore contain many practical examples, as well as a set of review questions at the end of each. The final volume contains a general index. Typographically the work is good. Paragraph subjects are printed in black-faced type and the remainder in a large clear type, easily read. The engravings, of which there are over 2,000, are excellent. The total work contains 2,500 pages.

## TRADE CATALOGUES.

*Graphite Paint.*—The International Acheson Graphite Company, Niagara Falls, N. Y., sends an interesting booklet descriptive of Acheson graphite paint. The graphite used in this paint is not a natural mineral graphite, but it is artificially produced in electric furnaces. It is claimed that paint containing this graphite is absolutely unaffected by any acids or alkalies, gases of combustion, sulphurous vapors or other destructive elements. Illustrations of buildings, bridges, etc., in which the steel work was coated with paint containing Acheson graphite are shown. These include the post-office building, Chicago; the Metropolitan Life Insurance building, New York; the plant of the National Tube Co., Lorain, Ohio, and the Williamsburg bridge, New York.

*Chloride Accumulators.*—The Electric Storage Battery Co., Philadelphia, Pa., sends an illustrated catalogue of its chloride accumulators. Illustrations of the different types of storage batteries as well as tables which give their sizes and capacities are shown. Types "E C S" and "E L S" are especially designed for car lighting. The voltage of the cells of all capacities is slightly above two volts on open circuit, and during discharge at the 8 hr. rate the voltage varies from that point at the beginning to 1.75 volts at the end.

*Metal Water Towers, Etc.*—The Chicago Bridge & Iron Works, Chicago, Ill., sends a catalogue descriptive of its elevated steel water tanks. These tanks are made with hemispherical bottoms, and illustrations showing tanks ranging in capacity from 50,000 to 200,000 gallons, placed on steel towers, are shown. This company also makes steel smoke stacks; illustrations of these stacks and a table which gives the proper sizes of chimneys to care for different boiler ratings is given. Other interesting data and tables of interest to designers of water works plants are also given.

*Injectors.*—The Hayden & Derby Manufacturing Company, New York, sends a miniature edition of its large catalogue. It is a convenient size for pocket use and contains descriptions and illustrations of injectors, ejectors and jet apparatus made by the above company. It also contains a number of valuable suggestions as to the proper type and size of injector to use for different conditions of work.

*Roofing.*—The Standard Paint Company, New York, sends its January issue of "The Exchange." It contains a number of half-tone illustrations showing shops, buildings, etc., which are covered with "ruberoid roofing." It also gives illustrations showing

the application of "ruberoid roofing" to both the inside and outside of lumber dry-kilns.

## CONTRIBUTIONS

### A Senate Committee of Investigation.

Jan. 31, 1905.

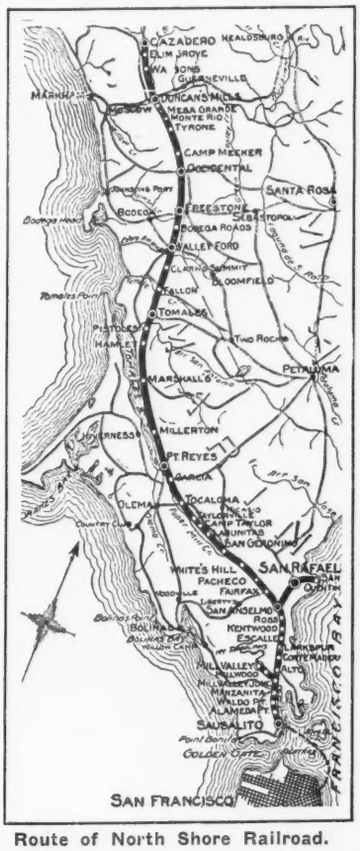
TO THE EDITOR OF THE RAILROAD GAZETTE:

Instead of rushing blindfold into railroad legislation, thus, perhaps, adding to the blunders of existing legislation, might it not be well for the Senate to appoint a committee of investigation for the purpose of determining what are the existing evils, and their causes, what remedies the existing laws afford, and what additional legislation is needful and practicable? I have in mind the very able report of the Senate Select Committee, that preceded the passage of the Act to Regulate Commerce, of 1887. This is one of the ablest reports on the railroad problem that I have ever seen. It may be said that the question of additional legislation is already before the House and Senate Committees on interstate commerce, and that the appointment of a special committee would seem unnecessary. But it seems to me that investigation by a special committee would be more thorough and comprehensive, and that the railroad side of the case could be better presented. It would also give more time for the excitement, largely created by the Interstate Commerce Commission and some of the western commercial associations, to subside.

HENRY FINK,
Chairman of the Board, Norfolk & Western.

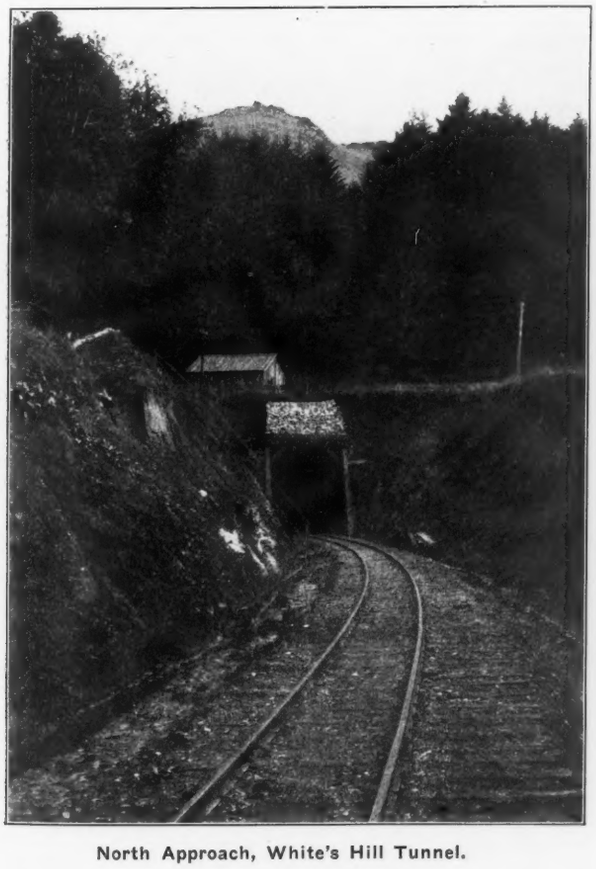
### New Tunnel on the North Shore Railroad.

The North Shore Railroad, operating between San Francisco and Cazadero, Cal., has a main line 87 miles long, which passes through one of the most picturesque portions of the Coast Range Mountains. The main division is narrow gage, while the suburban division, also formerly a narrow-gage line, which runs from Sausalito to San Anselmo and San Rafael, was opened as a third-rail electric line on Sept. 15, 1903. This portion of the road connects San Rafael, Mill Valley and Mount Tamalpais with San Francisco, as the company operates its own ferries between Sausalito and San Francisco, a distance of six miles. The main line, narrow-gage trains, which are operated by steam, also run into Sausalito, using the same right of way as the electric trains from Sausalito to San Anselmo, a distance of 10 miles. Between Sausalito and San Anselmo is the Corte Madera tunnel 2,200 ft. long, which is lighted by electric lights placed at short intervals on the sides.

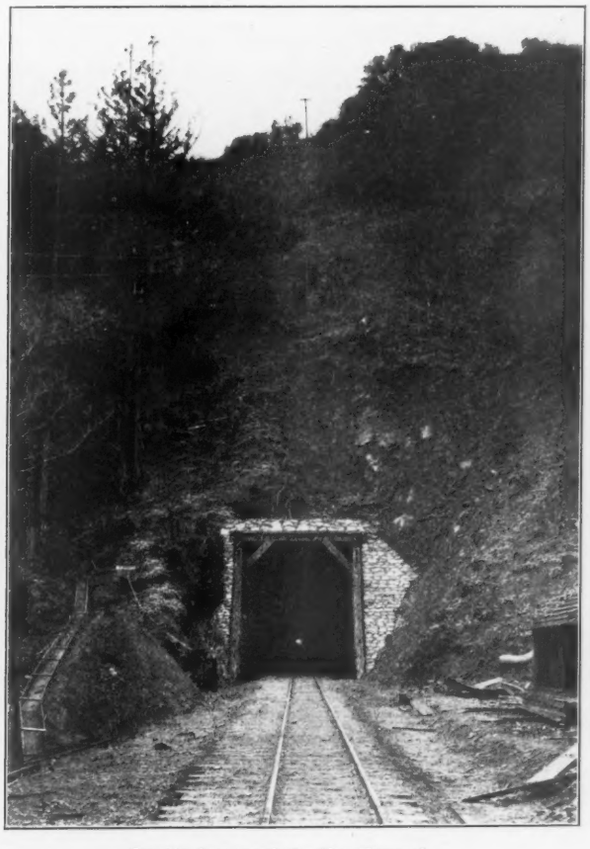



Route of North Shore Railroad.

The narrow gage line from Sausalito to Cazadero encounters some heavy grades among the hills of Marin and Sonoma counties. The heaviest one is at White's Hill, about 20 miles north of San Francisco, where a 2½ per cent. grade is encountered, running for a distance of about two miles. To push trains over this grade, it was necessary to employ double-headers, and sometimes a rear-end helper besides. Owing to the rapidly increasing traffic of the railroad, about two years ago, the North Shore management decided to do away with this grade, and work on a tunnel under White's Hill was begun in April, 1903. The contract was originally given to Martin & Hinkle, who subsequently, in February, 1904, threw up the contract, alleging a steady loss. The work was then taken up by the railroad company's own forces, and rapid progress was made so that the line was finally opened for traffic on Dec. 4, 1904. The length of the tunnel is 3,190 ft., or about three-quarters of a mile. It is standard gage, 17 ft. wide and 20 ft. high, and is thus ready to meet future requirements when the road is changed to a standard-gage line. The tunnel is built on a tangent and is timbered with 10-in. x 14-in. beams. It saves two miles in distance, 28 deg. of curvature and 104 ft. of vertical grade, as compared with the old route over



North Approach, White's Hill Tunnel.



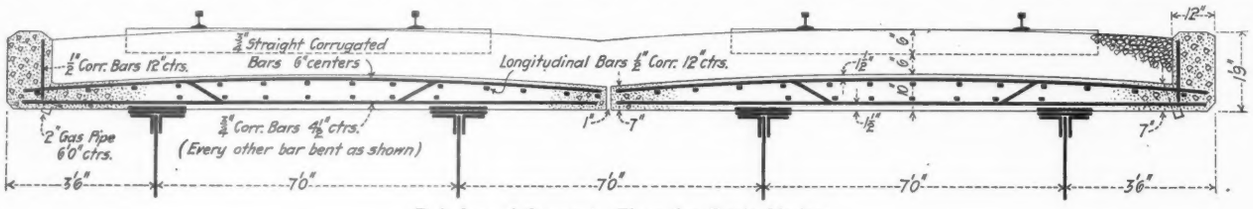
South Approach to the Tunnel.

White's Hill. The percentage of grade, however, remains unchanged. The engineer's report says that the tunnel was driven chiefly through a quartzite strata. The approximate cost of the entire work was $175,000. The running time of trains has been reduced about 30 minutes to points north of the tunnel, and the distance between San Francisco and Cadazero has been cut from 87 miles to 85 miles.

We are indebted to B. H. Fisher, Chief Engineer, and to J. L. Frazier, General Manager, for the data furnished and the photographs shown.

### Reinforced Concrete Floor for Deck Girders.

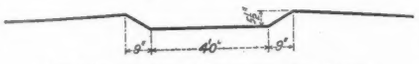
Several of the more important bridge designs used on the Eastern Illinois & St. Louis R. R., the connecting link by which the Frisco's Chicago-St. Louis line was established, were described in these columns when the road was being built (*Railroad Gazette*, June 12, 1903). Since that time an interesting design of reinforced concrete deck floor has been applied at Villa Grove, a drawing of which is shown herewith. The bridge consists of three 30-ft. and one 40-ft. span. When the design was prepared the intention was to build the floor in slabs 6 ft. wide at some convenient point and place them on the girders afterward but before beginning the work this plan was changed. Instead of a series of 6-ft. slabs side by side, each track floor was built in place on the girders, and made continuous, with expansion joints coinciding with those of the girders beneath.




Reinforced Concrete Floor for Deck Girders.

For each track, the floor is 10 in. thick at the center and 7 in. thick at each side, with a straight bottom and crowned top, the side-drainage drop being therefore 3 in. A parapet 1 ft. 9 in. high and 1 ft. thick is formed at the outer edge with 2-in. iron pipe drains spaced 6-in. centers, at the inner corners. Between tracks a 1-in. space is left for drainage. Johnson corrugated bars are used for reinforcement, ¾-in. bars transversely and ½-in. bars longitudinally. The top transverse bars are 6 in. on centers, 1½ in. below the surface and parallel thereto. The bottom bars are 4½ in. on centers, with every other bar bent as shown in the detail sketch, to take care of the shearing stresses. The parapet has short vertical lengths of ½-in. bars close to the inner face and laid to 12 in. centers. The longitudinal bars are also spaced 12 in. Gravel concrete was used, the mixture being in the proportion of one barrel of cement to each cubic yard of concrete.

The bridge is designed for Cooper's E-50 loading. The total dead load per lineal foot of track above the girders is 3,000 lbs., one-half of which is in the concrete deck. The estimated cost of this deck is $5.25 per lineal foot of single track. The bridge was designed by Mr. T. L. Condron, M. Am. Soc. C. E., Consulting Engineer, Chicago, under the direction of Mr. W. S. Dawley, Engineer Maintenance of Way of the Chicago & Eastern Illinois. The bridge is located at the end of a switching yard and in order to permit switchmen to pass across freely when cars are on the bridge, a sidewalk is being built on each side of it, supported by cantilever beams running over the parapet and bolted to the deck.




Details of Bent Reinforcing Bars.

### The Employment and Preparation of Firemen.*

Where a railroad system is very extensive, the Division Master Mechanics should be the final employing officers for firemen, and at least such shopmen as are to be considered prospective firemen, instead of leaving this duty entirely in the hands of the division foreman or traveling engineer.

Practically all locomotive engineers of this country received their early training as firemen; on the same railroad in most cases. Many firemen come from minor positions in the roundhouse or shops. Hence it is seen how important is the duty of employing firemen and shopmen, and their training after suitable men are employed. Although the obtaining and filing of applications can be entrusted to clerks or minor officers, I believe that the final employing officer of a railroad, no matter how large the system, should be an officer of as high rank as possible and in passing upon the applicant the latter should be present. The influence thereby imparted to a prospective employee is very great. The application blank should include all available information and attached thereto letters of reference obtained direct from former employers or business men whom the candidate has given as references of his education and character. The application blank should show name, home address, nationality, where born, age, height, weight, school advantages, if married or single and those dependent upon him for support; a list of those employers for whom he has worked, his occupation with them and dates; whether his general health has been good and if he is addicted to the use of intoxicating liquors. He should be questioned particularly on these last two matters as robust health is essential to his future success; he should be asked if he thinks that an employee in the engine or train service of to-day should drink at all, either on or off duty, and no effort made to conceal the employer's view thereon. Do not employ all men of the same nationality; mix them judiciously.

There is not a railroad company in this country whose business fluctuates that does not prepare locomotives and cars for their expected busy season, yet how many are there who as carefully prepare for the obtaining of suitable men for firemen with which to meet such increased business? Is it not quite often the case that, during the duller seasons of the year, a letter or personal applicant receives no reply or else the mere information is conveyed that "we are not hiring men now"? Why not take a lesson from the world powers and "in time of peace prepare for war"? Before the period of business increase, the employing officer should have on file a list of applications with as full particulars as possible. This work, being properly outlined, can be carried out by a clerk, the use of perhaps five or six letters of inquiry in each case, the thought being to always keep in touch with any change in the address of applicants and to advise them from time to time as to the probable date they may expect to be called for. Last fall, before hiring some 75 firemen, the writer had a list of over 100 applicants, many of them experienced men, and a large number of the remainder had taken up and completed some correspondence course on combustion and locomotive firing. In this way a rapid increase in business can be cared for without the delay to traffic due to shortage of men and without the demoralizing necessity of dropping all other urgent business at such time in order to obtain the men needed.

Have a series of blank forms, and number them so that you can briefly refer to them in that way. When you receive a letter from an applicant, send him form No. 100. When you want more applications than you have on file, send form No. 107 to the station agents and roadmasters along your line. Form 103 sends an employed man to some division foreman for a fireman and obtains in reply his record of starting work. Form No. 102 starts a man in roundhouse or shop work as a training for firing, etc., etc. These several forms are shown at the end of this paper merely as suggestions in the way of carrying out a policy with as little labor as possible.

There are perhaps five classes of young men from which we may obtain our future enginemen:

First, the farmer boy whose training usually results in producing an industrious man, but whose school advantages are generally limited to the "three Rs."

Second, the country lad, who may or may not have spent much of his time on the farm, but who has lived in or near a small town and had school training up to or better than the eighth grade or entrance to high school. Either of these two classes may have followed threshing outfits and perhaps fired or run a portable boiler.

Third, the city chap who has more assurance than industry, more education than application; who needs more watching than the former classes, yet in exceptional cases makes a most competent and efficient employee.

Fourth, the sons of older railway employees who enter the service with greater aptitude on account of their general knowledge of its requirements and hardships, and whose parents, themselves often deficient in early school advantages, have seen to it that their sons are better prepared therein to enter their life work. This class of men are more likely to stick to their "jobs" and carry out their undertakings, as they are acquainted with the fact that the fireman on a modern locomotive has something else to do beside sit on the seat and flirt with the passing country girls.

Fifth, the technical school graduate, with whom I must confess to have had very limited experience. The few that I have had

*Presented to the January meeting of the Western Railway Club, by E. W. Pratt, Master Mechanic, Chicago & North Western Railway.

work for me as firemen have evidently taken up the work awaiting some more congenial employment rather than as a life work.

While a few months roundhouse experience is of advantage to boys of all these classes, I believe it should be required of any who have never fired even a stationary boiler. In the roundhouse they should not be kept at cleaning and sweeping until they become discouraged and quit, but effort should be made to employ them cleaning fires, hoeing ash-pans, calling, firing stationary boilers, helping the engine hostlers and firing up locomotives. 'I call this training most valuable because a young man learns something of the details of railroading, such as the importance of promptness in the service, the results of good and poor firing as seen in the shape of fires in engines at terminals; he also learns the uses of the various parts of the boiler, he learns the signals, and above all else gains the confidence necessary to fire an engine properly. If he can help a roundhouse machinist or help the boiler-washer, it will also be of advantage; he may even have an occasional chance to fire a switching engine for a few hours in an emergency. The foreman should arrange to permit such boys as he judges will be recommended for firemen, to deadhead over the road two or three trips on an engine with a first-class fireman.

In the case of men starting in the shops and with others shortly before the probable rush period, send applicants to the company's examining surgeons so that they will be immediately available in case of necessity for firing. The foreman of each terminal shop should have working under him few of such men and the authority to use them as firemen whenever needed. This is of great advantage besides saving considerable expense in deadhead time.

In so far as possible, all inexperienced firemen should start work on yard or way freight engines where there is apt to be less delay to traffic from lack of steam while they are learning the rudiments of stoking. If the company does not furnish a book of instructions on locomotive firing and combustion, keep some good but inexpensive book or correspondence course on hand, recommend it to all inexperienced men, even selling it to them at cost if necessary. What you are after is result; so, if you believe in a thing, carry it into execution.

Avoid, if possible, hiring men who are "broke." New men do not understand that their first pay day does not come for over a month, and some small sum on hand to start with may prevent garnishment of their first wages and their consequent discouragement. Some of the best firemen that I ever had gave up the work on this account.

New firemen should not be regularly listed and given rank for the first six months of their service. The older man should be given the preference in work at his terminal by the foreman, but not the privilege of going to some distant part of the division to displace a man who is a few days younger in the service. During this six months' period they should also understand that they are on probation. To gain full advantage in this respect, it is necessary to obtain such reports from division foremen, road foremen, and traveling firemen (see form No. 104) as will enable you to intelligently drop from the service inside of the six months, regardless of their relative age in employment, such men as seem the least adapted to the work or appear likely to become "disturbers of the peace." Treat such unfortunates with courtesy and consideration, explaining to them their weak points and probable inaptitude which makes them less desirable than others. Give them passes home, if within reason to do so, and wish them well in their future occupation. The reputation of a fine gentleman, now a railroad president, but then the manager of a small road, is worthy of imitation:

An engineer, old in the service, had become involved in serious trouble, and was called to the manager's office and the gravest discipline accorded. The "boys," waiting outside, accosted the engineer, who, though serious, was anything but depressed.

"Well," they said, "what did the old man have to say?"

"There," he replied, "is the finest gentleman I ever met."

"Why," they said, "did he put you back to work?"

"No, indeed; he discharged me, but he talked to me like a father and explained things to me as I had never understood them before. I would rather be discharged by that man than to be put back to work by any other man I ever met." It is needless to say that, with discipline so effectively received, he was not long out of the service.

After dismissing all undesirable men, if necessary to further reduce the list in times of slack business, have a "lay-off" list on which you place the youngest men first. Men on this list are given to understand that they will be re-employed, the oldest first, provided they keep you advised of their address. On the railway with which I am connected, for many of the men we find temporary employment on other divisions, where they serve without rank until recalled.

Both in hiring and in dismissing men one should bear in mind the future as well as the immediate needs, and endeavor to make a reputation that will be of growing benefit to himself and to his company. The company's attitude will, whether you wish it or not, be considerably advertised, and ultimately result in the securing of better men in the years to follow.

As is quite generally known, the Chicago & Northwestern, as one of the first to adopt it, has a system of first, second and third years' progressive mechanical examinations. Each fireman is given the first year's book of questions, together with the book of rules and time card immediately he is employed. As soon as convenient after the expiration of his first year's service, he is given a written examination thereon by the traveling engineer or traveling fireman, who also examines him orally. If successful in passing this, he is given the second year's book of questions, upon which he is examined a year hence in the same manner. At the end of his third year the fireman is examined by a joint board of examiners appointed for the whole system, which board sits in Chicago each spring and fall. Some of the traveling engineers and the air-brake instructor compose this board, and their favorable report makes the man eligible to promotion to an engineer whenever needed as such on his own division thereafter.

The failure to pass any one of these progressive examinations results in a second trial six months later; two successive failures drop a man from the locomotive service at once, as no men are permitted to waive their right to promotion.

When firemen have passed their mechanical examinations for promotion to engineers, they should, as soon as possible, be sent to the train department for time card and book of rules examination so as to be eligible for use as engineers at any time.

Just previous to the expected busy season, such firemen should be required to fire on runs where they can readily be had for running and new firemen put in their places; for, if they are permitted to take work where their lay-over is at outlying points, too much delay is occasioned in relieving them and getting them to the main terminals where needed.

If it happens that on any division promotion is so slow that a fireman has to fire for more than three years, it should be required that he fire in freight service at least three months immediately previous to being promoted, this because a long period of firing in passenger service is not good experience immediately preceding promotion to an engineer, where he will begin work in extra freight service.

During one busy season it was required as an experiment that each inexperienced man employed should take a certain course on firing and combustion, the cost of which was very small. That fall, among the seventy-five men hired, there was not a single instance of burned-out locomotive grates, and compared with the year previous, on the ton-mileage basis, a saving of over $60,000 in coal was effected, besides considerable in running repairs; for much of the boiler repairs to locomotives results from poor firing —usually too heavy firing.

I believe that the time is not far distant when the leading railroads of the country will demand a knowledge of combustion and at least the theory of firing, and have an examination covering those subjects which an applicant must pass before employing him for a locomotive fireman; also that he should know the signals and flagging rules. When we consider that a few weeks' study and a small tuition will give a young man this information, there is nothing unreasonable in demanding this previous preparation for a position that pays from $70 to $100 per month; but there is a practical difficulty today, namely, with less rigid requirements, many roads find it impossible to obtain enough men who can stand the service, due to the advent of modern coal-burning locomotives of such great size. Nor can we look for marked change in condition until mechanical stokers of successful design are inaugurated and extensively used. When we have to hire "coal heavers," we cannot expect to be getting much brains; hence I believe the railroads of the country are not paying sufficient attention to the use and development of these labor-saving devices for the fireman, for several of them are as efficient as some other apparatus when first applied to the locomotive, and it would not be unreasonable to expect great improvement therein, were sufficient inducement offered.

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[Proposed form of report from Road Foreman and Traveling Fireman.]

Dear Sir:—

I have ridden with the above named fireman ..... times and taking all points into consideration I would consider him to be a ..... (Good, Fair or Poor) man.

His good points are .....

His undesirable points are.....

The engineers and division foremen for whom he has worked think him a ..... fireman, and ..... desirable to retain in the service.

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[Blank to be filled out by each fireman for the first six months of his service.]

Dear Sir:—

During the past month of ..... I have fired principally as follows:

Engine No. ... Engineer ..... Did engine steam well? .....

Was engine light on coal? Were you able to have fires light and in good shape at terminals? .....

Have you improved and gained greater skill in firing the past month?.....

Are you able to stand the hard work of firing heavy engines? .....

Do you make it a practice to obtain good rest and sleep when off duty?.....

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[Form of letter to station agent.]

Dear Sir:—

About (date) ..... and thereafter we are likely to need more firemen on short notice. If you know of any young men of good character, reliable habits and at least an 8th grade school education, I

would be glad to entertain their application. Please have any such as you can recommend write to me, giving their age, weight, height and school advantages, and I will communicate with them, if satisfactory.

It is desirable that those not familiar with service in the mechanical department should, for a few months, work at any and all kinds of roundhouse and shop work. To that intent, we find places for as many prospective firemen as possible at our various division points.

DISCUSSION.

Mr. F. P. Roesch (Hicks Loco. and Car Works).—It seems there is quite a diversity of opinion as to what is required; one man wants brains, another wants brawn. Brain is needed just as much as muscle. A man can save more coal with his head than he can with his back. Most railroads now put a minimum limit on the weight of a man to be employed. It is not much harder to do the actual firing on the large locomotive of to-day than it was on the small locomotive of 20 years ago. I have fired engines with a fire-box about the size of my hat and from that up to the largest decapods that are built; and generally it is not the shoveling alone that wears out the fireman; it is the other duties connected with it, such as opening the door, that wear him out. We are expecting too much of the fireman nowadays. The pooling system has had quite a lot to do with the ruination of firemen. In old times each man had his own regular engine, and the fireman and the engineer practically owned the engine; they took a personal interest in the amount of coal consumed, and in the condition in which the engine was kept; they tried to keep it as neat as possible. To-day when a fireman gets off the engine, you do not know whether he is white or black. He sneaks through the alley; he is ashamed to be seen in the public streets. He has no place to put his clothes. Half the engines that are pooled have no "squirts" on them to wet down the coal; and they are dirty inside and out. We ask the fireman to help clean the engine, to fire it, to crack the coal, and to shake grates that are all coupled together so that three or four men could not shake them. No wonder the romance is gone. I have hired fireman in the East and in the West and the same conditions prevail in every place. Now, we can all adopt fine plans, and resolve strictly to adhere to them in hiring firemen; but if there comes a rush you will get messages like this: "Send me 20 firemen at once; am tied up." Then we go down town and round up anything we can get hold of. Of course, it is well enough to promise ourselves to weed out afterwards, but it is always easier to get the men than it is to get rid of them. We might as well be honest with ourselves. When we get right up against it and we want an engineer real bad, we pick out the brightest fireman, and if he does not happen to pass all the questions, we shove him up anyhow, and trust to luck. This is the trouble. In our effort to save fuel instead of commencing at the cylinder, we should take up just exactly what we are taking up to-night—the question of firemen—and begin to save our coal at the wooden end of the scoop.

We ought to make things more pleasant for the firemen. Have their coal cracked; it does not cost much. It is economy and it saves fuel to have it cracked in firing sizes. Have the engine moderately clean; do not ask firemen to wipe these great big engines, where the jackets are measured by the acre. Give them a clean seat box to put their clothes in. Have a "squirt" to wet the coal down occasionally. Have the grate rigging so arranged that the fireman does not have to break his back to shake it.

Another question is this "preparing for the rush." It has been suggested to have a lot of applications on file. I had a thousand last year. But when you send for these men you do not always get them. We ought to have bright young men in our roundhouses, either as machinists' helpers or as wipers.

Mr. W. E. Symons (Kansas City Southern).—In reference to the different engines and the condition of the firemen, I think possibly it is not as bad in all places as has come under Mr. Roesch's observation. My experience has been that in recent years both locomotive engineers and firemen have received very material and substantial increases in pay, and that their conditions have been bettered in various ways. I speak from personal experience, and I think I am correct in saying that on a large majority of the roads to-day the firemen do not clean their engines except the cabs. I personally know of a number of roads where they do not clean anything except cabs, and seldom ever clean the cab, and some of them are on runs where they are only two and one-half to three hours in real service. They are earning from $100 to $125 a month, which is more money than the most skilled mechanic can expect to earn after completing a long period of apprenticeship and entering upon his trade. As to shaking the grates, I believe that that is usually remedied where the engine crew take a personal interest in the engine, and co-operate with the roundhouse foreman and others in authority to the end that such defects as are discovered on the road may be properly remedied and repaired in the shop. Failing to do this, leaving a broken grate for the next man to take out produces unsatisfactory results. We try to get our firemen seat boxes; we arrange to put curtains on the cabs, we have "squirt" hose attachments to all the injector pipes, and my observation has been that a number of roads in the same territory are similarly equipped.

The question of seniority has had considerable to do with diminishing the interest of firemen in their work. But the introduction of progressive examinations and other educational features has resulted in quite an awakening among enginemen and the firemen. The Locomotive Firemen's Magazine to-day is publishing a series of questions and answers and charts about technical subjects and mechanical subjects that if read and studied by the members of their craft, will aid largely in advancing them in their profession. I am told by local members of the fraternity that they are going to encourage this study all they can. Firemen, as a class, are better paid in proportion to the work they perform than any others. Therefore we have a right to expect from them good returns; and I believe we are in most cases getting them.

## Two Remarkable Locomotive Fires.

BY C. H. CARUTHERS.

Although locomotives have often passed through serious fires in connection with collisions, or burning shops and engine sheds, it has rarely been the case that the engines so burned could not be repaired and again placed in service.

Such an instance, however, occurred in 1884 at Hunker, a station on the southwest branch of the Pennsylvania Railroad, about 40 miles east of Pittsburgh. The branch at that time had but a single track, and immediately east of the station named was a long passing siding. About midnight, an engine drawing a long train of empty coke cars was approaching this siding rapidly, when it ran into a westbound engine drawing a long train of cars laden with coke, which had disregarded a red samaphore signal one mile distant from the scene of the accident.

Pittsburgh Roundhouse, after Fire in 1877.

The crews of these trains escaped serious injury by jumping, but the engines were instantly covered by nineteen cars, most of which were loaded, and these piled up in a lofty mass which took fire and burned furiously for forty-eight hours. The flames were finally extinguished by a steam fire engine which was brought from Pittsburgh, and pumped water from a nearby stream, but the engines were so utterly ruined that the wrecking crew simply blew them into sec-

tions with dynamite and loaded them in this shape on cars.

Great, gaping holes were burned through the steel sheets of the boilers and fireboxes, and the cast-iron wheel centers while retaining their general outline were apparently on the verge of melting when the intense heat was subdued. The brasses of the rods, and their steel pins were actually fused together.

A notable incident in connection with the destruction of these engines, was that they were of consecutive numbers—430 and 431—notable, because at that time the company owned over 1,000 engines numbered consecutively, and these were distributed over the various divisions of the road regardless of the numbering. Both were of the class "I," consolidation type—now known in the new classification as class "H 1," and both were immediately replaced by two of the same type, building at the time at the Altoona shops.

Another memorable fire in the history of the Pennsylvania Railroad, was the burning of the round houses and shops at Pittsburgh during the memorable riots of July 22, 1877. In this fire, 104 locomotives were burned. The large proportion of these stood in two round houses, a few were in the repair shop, and a few others stood among the burning cars at various places in the yard. No. 210, one of those in the shops, had just completed an overhauling and stood in the paint shed. The burning away of the supports of the track allowed this engine to fall into a cellar in which a large quantity of paints and oils were stored. In the intense heat caused by these highly inflammable materials, No. 210, received such a roasting that it was deemed unwise to repair it—especially as the boiler was that of a Smith & Perkins locomotive built for the company at Alexandria, Va., in 1853, but placed on new running gears of Mogul type at Altoona, in 1866, and under a new number.

The 103 other engines were taken to the shops of the company, and some to Baldwin's, and again put in running order, remaining on the road for many years. Some, however, gave trouble from a tendency to leak, but no instance is recalled where any of these boilers exploded.

The photograph from which the accompanying illustration is made, shows the Twenty-sixth street roundhouse (now torn down), about one week after the fire.

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The Austrian locomotive and car builders continue to complain bitterly of hard times. The locomotive works, with capacity for 460 engines per year, had orders last year for about one-third of that number, and the number of men in their employ is 44 per cent. less than in 1901. The car works are still less well off; they have reduced the number of their employees two-thirds, and are begging the Railroad Ministry to give them work enough to keep this reduced force on half time through the winter.

## A Group of New Ferry Houses.

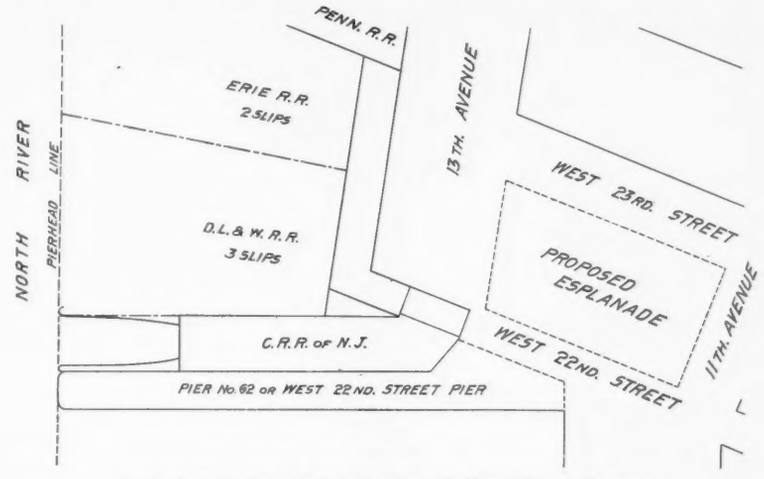
The accompanying half-tone illustration shows the general appearance of the group of three ferry houses being built by the Erie, Delaware, Lackawanna & Western, and the Central of New Jersey railroads respectively. As shown, the group occupies a space of two blocks extending along the river front and West street between 22d and 23d streets. A description and the general plan of the Lackawanna ferry house which forms the center of the group was printed in the *Railroad Gazette* of Jan. 15, 1904, and the first and second floor plans of the Erie and the Central of New Jersey houses are given here-


*Central Railroad of New Jersey.* *Delaware, Lackawanna & Western.* *Erie Railroad.*

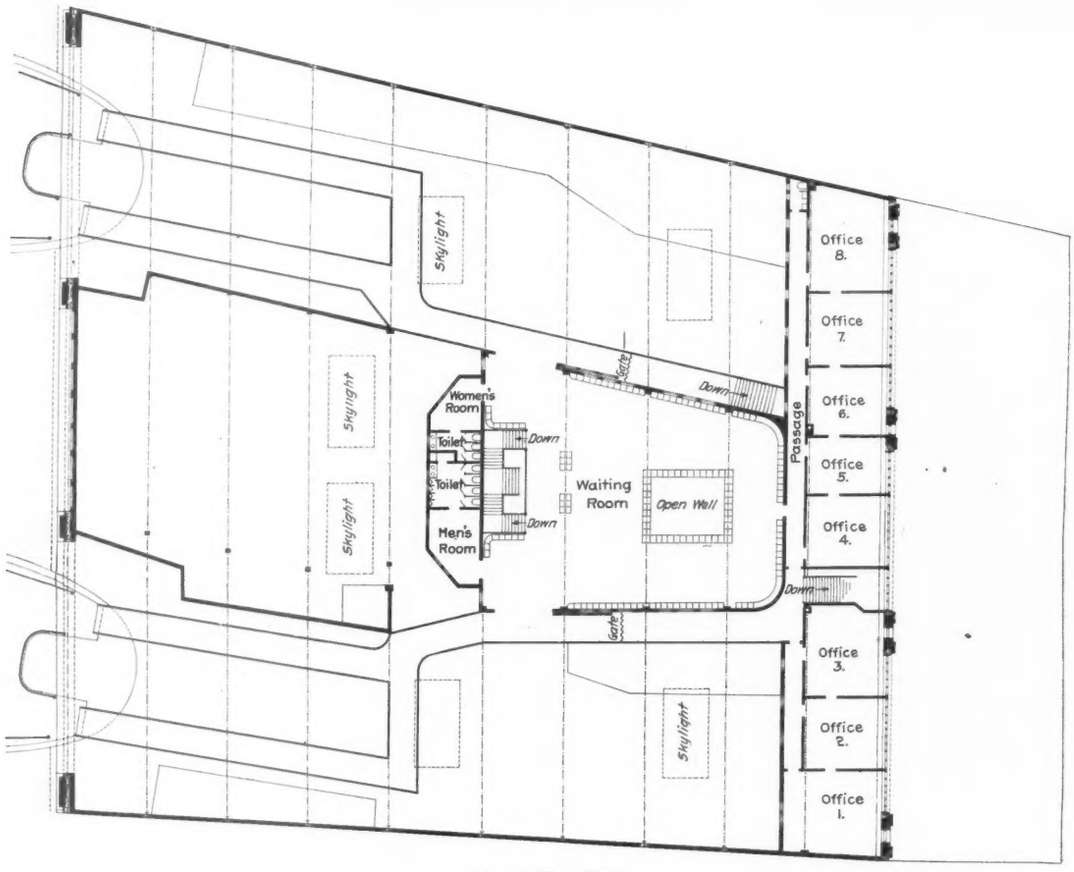
**West Street Elevation of New Ferry Houses at 22d and 23d Streets, New York City.**

with. Kenneth M. Murchison, New York City, furnished the complete plans for both the Lackawanna and Erie houses as well as for the exterior of the Central Railroad of New Jersey ferry house. The steel work and the interior designs of the latter were made under the direction of J. O. Osgood, Chief Engineer, and A. H. Dakin, Jr., Assistant Engineer. All three ferry houses are of steel frame construction sheathed on the outside with ornamental sheet copper. The roof is of slag and the interior finish is of sheet metal painted and trimmed with light wood. There are no projecting hoods as in the majority of ferry houses, but the boats run directly into the buildings, thus affording excellent protection to the passengers in stormy weather. By means of two suspended transfer bridges the passengers are transferred from the upper deck of the ferry boats directly into the second story of the ferry houses. The ground floor of each of the houses is provided with a large general waiting room, toilet rooms, baggage rooms, ticket offices, information bureaus, etc. The second floors contain a large waiting room and office rooms. The floors of the main waiting room and passenger exits of the Central's ferry house are of asphalt and the driveway for teams is of creosoted wood block. While the floor of the Erie's main waiting room is of ⅞ in. maple, the floors of its passenger exits are of ⅞ in. yellow pine, and the driveway for teams is of 3 in. spruce.

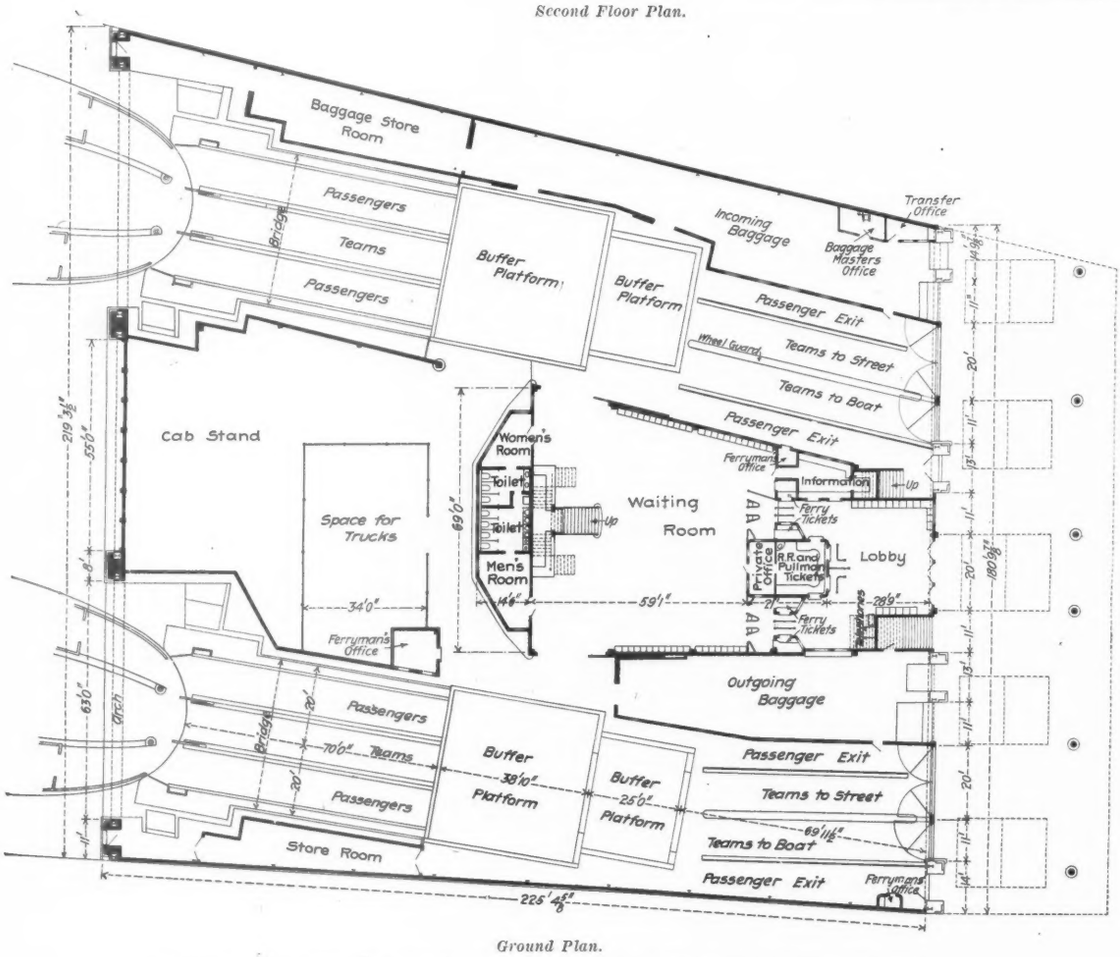
The Central's ferry house has one slip and the Erie has two slips, whereas the Lackawanna has three slips; two of these are to be used for the boats running to its Hoboken railroad terminal and the other is to be used for the boats running on its ferry to 14th street, Hoboken. Each house is provided with electric signs bearing the name of the railroad and the name of the ferry. A shed 50 ft. wide and about 600 ft. long made of iron and glass will extend along the front of the three buildings, and the cars which come down 23d street will pass around a loop and




**General Plan Showing Location of New Ferry Houses.**

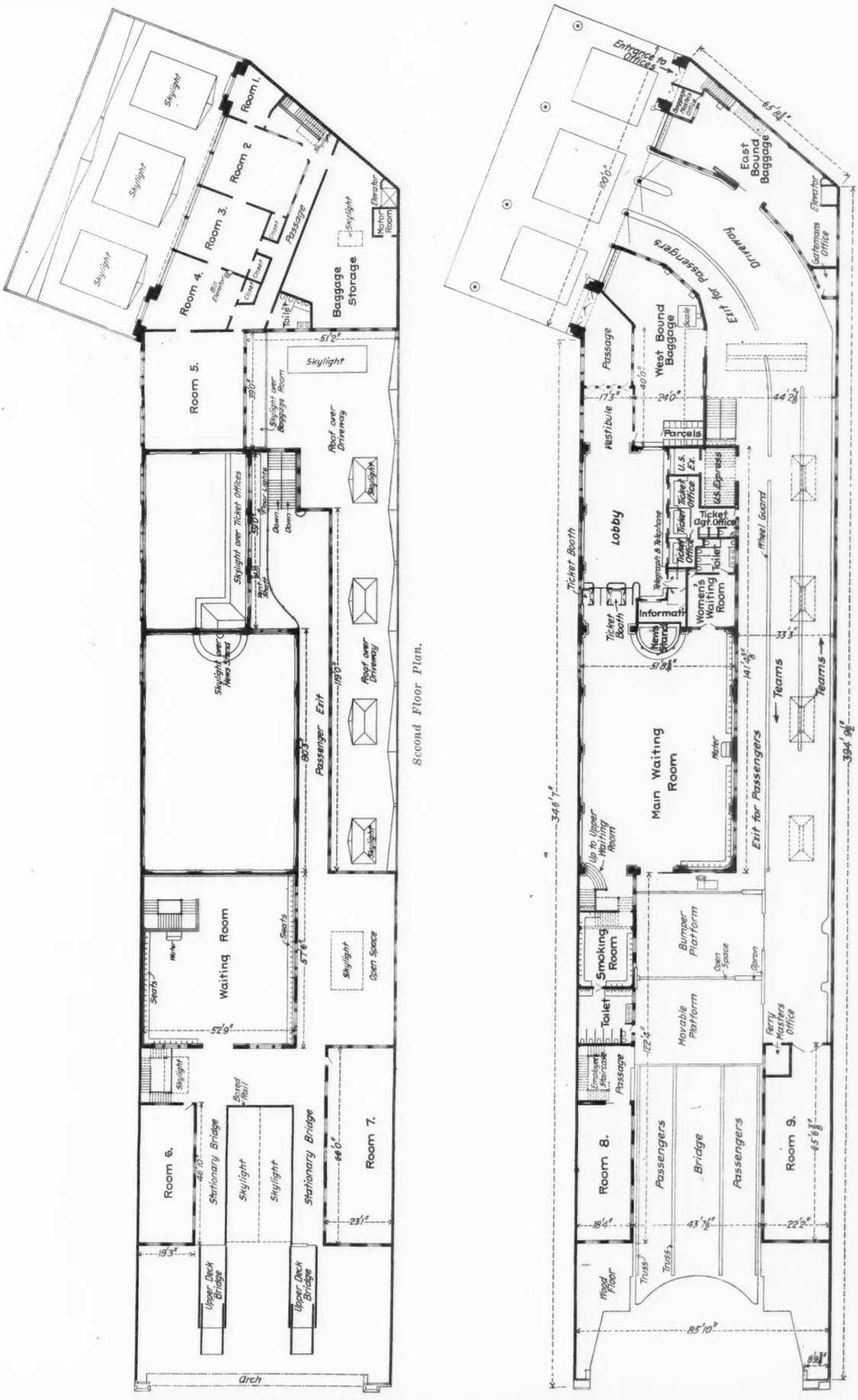



*Second Floor Plan.*




*Ground Plan.*

**General Plan of the Erie Railroad Ferry House at 23d Street, New York City.**




General Plan of the Central Railroad of New Jersey Ferry House at 22d Street, New York City.

go under this shed, depositing their passengers at the doors of the three ferry houses. The city proposes to buy the block in front of the group and turn it into a handsome approach or esplanade. The estimated cost of the three ferry houses is about $850,000, and it is expected that the buildings will be completed in the early fall of the present year.

## Accident Bulletin No. 13.

The Interstate Commerce Commission has issued Accident Bulletin No. 13, showing railroad accidents in the United States during the three months ending Sept. 30, 1904. The number of persons killed in train accidents was 411, and of injured 3,747. Accidents of other kinds bring the total number of casualties up to 14,239 (1,032 killed and 13,207 injured).

*Table No. 1.—Casualties to Persons.*

| Kind. | Passengers | | Employees | |
|---|---|---|---|---|
| | Killed. | Inj'd. | Killed. | Inj'd. |
| Collisions | 124 | 1,201 | 86 | 784 |
| Derailments | 104 | 922 | 86 | 470 |
| Misc. train accidents | .. | 31 | 11 | 339 |
| Total train accidents | 228 | 2,154 | 183 | 1,593 |
| Coupling or uncoupl'g. | .. | .. | 59 | 721 |
| While doing other work about trains, etc. | .. | .. | 46 | 2,613 |
| Overhead bridges | 4 | 23 | 23 | 293 |
| Falling from cars or engines or while getting on or off | 34 | 478 | 142 | 1,951 |
| Other causes | 10 | 518 | 303 | 2,863 |
| Total | 48 | 1,019 | 573 | 8,441 |
| Total, all classes. | 276 | 3,173 | 756 | 10,034 |

The total number of casualties reported as occurring in this quarter is less than for the corresponding quarter of the preceding year. The number of employees killed in coupling accidents (59) is 11 less; in train accidents (183) it is 37 less, and every item in that column is less, the total (756 employees killed) showing a falling off of 160. This is a gratifying showing, which it is to be hoped is not due alone to a diminution of the number of men at work. But the fatal accidents to passengers make an unprecedented aggregate, practically neutralizing the diminution in the number of employees killed. In Bulletin No. 10 (quarter ending with December, 1903) the number of passengers killed in train accidents (147) was more than three times the average of nine preceding quarters; and now we must record a total more than 50 per cent. greater than that in Bulletin No. 10.

Of the 228 passengers and 183 employees killed in train accidents 217 cases are accounted for by six accidents, and these 217 were nearly all passengers. The six cases were as follows:*

| | Killed. | Injured. |
|---|---|---|
| (*a*) Derailment No. 10 | 88 | 0 |
| (*b*) Collision No. 23 | 63 | 162 |
| (*c*) Collision No. 24 | 24 | 45 |
| (*d*) Collision No. 11 | 18 | 183 |
| (*e*) Collision No. 5 | 16 | 52 |
| (*f*) Derailment No. 2 | 8 | 45 |
| Total, in 6 accidents | 217 | 487 |

The first and fifth of these cases (*a* and *e*) illustrate the need of special inquiries into particular accidents if full and impartial statements of the facts are to be secured. The derailment (*a*), as will be seen by the statement of circumstances given below, was due to a bridge failure. From the conclusions of the coroner's jury which investigated the case there would appear to be

*These six cases were reported in the *Railroad Gazette*, as follows:
Derailment No. 10, Eden, Colo., (August), page 377.
Collision No. 23, New Market, Tenn. (September), page 482.
Collision No. 24, Litchfield, Ill. (July), page 250.
Collision No. 11, Glenwood, Ill. (July), page 250.
Collision No. 5, Midvale, N. J. (July), page 250.
Derailment No. 2, Pendleton, Mo. (September), page 482.

In reprinting the text of the Bulletin we omit some details which have already been made familiar to the reader by our former accounts of these accidents.

CAUSES OF THIRTY-SIX PROMINENT TRAIN ACCIDENTS (Class A).

COLLISIONS.

| No. | Class. | Kind of train. | Killed. | Injd. | Damage.‡ | Ref. to record. | Cause. |
|---|---|---|---|---|---|---|---|
| 1. | M. | P. and F. | 4 | 8 | $2,046 | 38 | Crossing collision; freight cars pushed into passenger train; 4 passengers killed. Conflict of testimony as to whether signalman withdrew clear signal from freight train after it was too late for the train to be stopped. |
| 2. | R. | F. and F. | 0 | 2 | 2,100 | 51 | Operator, 27 years old, with good record, gave clear block signal before preceding train had vacated block. He had fallen asleep and failed to put signal at stop after passing of train. |
| 3. | B. | P. and F. | 0 | 26 | 3,070 | 33 | Extra freight ran on time of regular passenger. Conductor of freight overlooked passenger train on time-table; engineman, new to this run, depended on conductor. These men on duty 18 hrs. 10 mins. |
| 4. | B. | P. and P. | 0 | 17 | 3,135 | 56 | Mistake in despatcher's order; operator, 15 months' experience, delivered order before repeating it back to despatcher. |
| 5. | R. | P. and P. | 16 | 52 | 3,700 | 2 | Operator gave clear block signal when preceding train was still in the block. (See note in text below.) |
| 6. | B. | F. and F. | 1 | 9 | 4,000 | 35 | Operator, 24 years old, in service 2 months, overlooked order to hold extra train. Order lying on desk covered by other papers. |
| 7. | R. | F. and F. | 0 | 0 | 4,150 | 53 | Occurred 5 a. m., in dense fog. Leading train unexpectedly stopped; second train allowed to follow from a block station on caution signal 2 mins. behind the leading train; was not run under control. Men in charge on duty 16 hrs. 30 mins. |
| 8. | B. | P. and F. | 2 | 5 | 4,400 | 8 | Conductor, engineman and fireman of empty engine forgot about a passenger train; fireman's experience 27 days. |
| 9. | B. | F. and F. | 2 | 3 | 4,400 | 65 | Conductor and engineman misread name of station in meeting order; operator had neglected to require them to read order aloud to him. |
| 10. | B. | F. and F. | 0 | 2 | 6,086 | 11 | Despatcher, 18 months' experience, gave meeting order to one train only, disregarding duplicate rule. |
| 11. | R. | P. and F. | 18 | 183 | 6,500 | 3 | See note in text below. |
| 12. | B. | F. and F. | 0 | 0 | 6,500 | 10 | Engineman fell asleep and entered yard too fast; fireman, 22 years old, 3 months' experience, did not think to awaken engineman; assumed until too late that latter was watching speed. |
| 13. | B. | F. and F. | 3 | 1 | 8,400 | 13 | Men in charge of northbound careless about rights of southbound. (See note in text below.) |
| 14. | B. | P. and F. | 2 | 8 | 9,933 | 5 | Brakeman of freight, 4 a. m., went forward to flag passenger train from opposite direction, but his signal was not seen; torpedoes not used. Brakeman's experience, 9 months on this road; 20 months elsewhere. |
| 15. | R. | F. and F. | 2 | 1 | 10,620 | 54 | Occurred 4 a. m. in dense fog; 5 cars broke away from rear of freight standing at tank and ran back; rear brakeman was on forward part of train. |
| 16. | M. | F. and F. | 1 | 5 | 11,620 | 19 | Engineman of empty engine, northbound, ran on time of regular southbound train. A conductor and an operator by lax conduct contributed. |
| 17. | B. | P. and F. | 2 | 10 | 14,400 | 7 | In fog, 4 a. m.; freight ran beyond end of double track without right. Engineman claims lost his bearings; fireman's experience, 6 weeks. |
| 18. | R. | F. and F. | 0 | 0 | 15,999 | 30 | Flagman not out far enough. |
| 19. | B. | P. and P. | 2 | 50 | 16,400 | 57 | Westbound train ran past meeting point: (See note in text below.) |
| 20. | M. | F. and F. | 0 | 6 | 16,900 | 39 | Southbound entering sidetrack struck by northbound double-head train. |
| 21. | B. | F. and F. | 0 | 6 | 20,000 | 6 | Freight ran past fixed stop signal and through crossover into empty passenger train. Engineman, 19 years' experience, asleep. One passenger car and 3 freight cars destroyed by fire started by illuminating gas leaking from tank. |
| 22. | B. | F. and F. | 0 | 0 | 25,000 | 12 | Men in charge of northbound extra forgot about southbound regular train. |
| 23. | B. | P. and P. | 63 | 162 | 36,000 | 58 | Conductor and engineman of westbound train forgot meeting order. (See note in text below.) |
| 24. | M. | P. and F. | 24 | 45 | 65,000 | 16 | Misplaced switch; believed malicious. (See note in text below.) |
| | | Total | 142 | 601 | $300,359 | .. | |

DERAILMENTS.

| No. | Class. | Kind of train. | Killed. | Injd. | Damage.‡ | Ref. to record. | Cause. |
|---|---|---|---|---|---|---|---|
| 1. | D. | F. | 0 | 1 | $485 | 25 | At derailing switch. Track circuit having failed, operator used emergency key to unlock lever; the lock being then out of service, operator allowed signal to indicate clear while derailing switch was open. |
| 2. | D. | P. | 8 | 45 | 3,750 | 89 | Two rear cars of passenger train, running 50 miles an hour, derailed on straight line. After accident track was out of line, but cause of derailment not determined; no defect found in rails, fastenings or ties, nor in cars. |
| 3. | D. | P. | 0 | 4 | 8,600 | 86 | At 25 miles an hour, on 8-degree curve, forward truck of tender jumped track. "Unable to locate cause." Elevation of outer rail 5 inches. |
| 4. | D. | F. | 2 | 3 | 11,730 | 84 | Runaway on steep grade; entire crew except fireman held responsible. One brakeman had only 7 months' experience. (See note in text below.) |
| 5. | D. | F. | 2 | 0 | 12,000 | 47 | Occurred 9 a. m.; open draw, signals at stop; engineman killed. |
| 6. | D. | P. | 2 | 8 | 12,000 | 24 | At derailing switch. Engineman and fireman killed. Engineman had received order to run slowly at this point, but was running fast. |
| 7. | D. | P. | 0 | 0 | 13,000 | 28 | Excessive speed over reverse curve. |
| 8. | D. | F. | 0 | 0 | 14,300 | 21 | Runaway; cars derailed on bridge, knocking it down. Runaway was started by 3 cars which, unattended, bumped against train in yard. |
| 9. | D. | P. | 0 | 0 | 17,936 | 90 | Train ran on burning bridge; origin of fire unknown. |
| 10. | D. | P. | 88 | 0 | 26,309 | 48 | Bridge gave way under train (See note in text below.) |
| 11. | D. | P. | 4 | 34 | 31,720 | 82, 83 | Train derailed on trestle and cars fell to stream below. Cause, malicious loosening of rail. All the men on the train being disabled, no danger signal was sent back, and 8 minutes afterwards a train consisting of engine and caboose, following, ran into wreck. Part of the personal injuries due to this second derailment. |
| 12. | D. | P. | 0 | 19 | 38,670 | 46 | Broken tender wheel; brakeage probably due to overheating by brakes sticking, unknown to men on engine. Wreck partly destroyed by fire from gas ignited from light in mail car. |
| | | Total, derailm'ts. | 106 | 114 | $190,500 | .. | |
| | | Grand total | 248 | 715 | $490,859 | .. | |

‡Damage to engines, cars, and roadway.

reason for making a thorough inquiry not only into the circumstances attending the accident, but also into the design and construction of the bridge and even the surveys and plans which were made to decide the location of the road and its elevation above the surrounding lands and streams. Such an investigation would have to be made on the ground, of course; not by correspondence from a city 2,000 miles distant.

The collision (*e*) is one in which the need of a full inquiry is especially important, because it occurred on a road where the block system is in use. The block system is the best means known for preventing collisions of this kind, and when it fails or appears to fail the exact circumstances should be laid before the public to the end that the responsibility for the resulting collision may be clearly understood. The securing of the facts in such a case obviously demands an inquiry on the ground. In the present case it appears that dependence was placed on the rear flagman of the foremost train to go back with hand signals; this as a supplementary safeguard in addition to the block signals; but he failed to do so, or failed to go as far as he ought to have gone. It also appears that the flagman was a person of limited experience in the duties of his position.

*Table No. 2.—Collisions and Derailments.*

| | | | Persons— | |
|---|---|---|---|---|
| Collisions: | No. | Loss. | Killed. | Inj'd. |
| Rear | 301 | $269,601 | 49 | 458 |
| Butting | 168 | 418,997 | 104 | 764 |
| Trains separating.. | 218 | 103,684 | 4 | 70 |
| Miscellaneous | 752 | 432,319 | 53 | 693 |
| Total | 1,439 | $1,224,601 | 210 | 1,985 |
| Derailments due to: | | | | |
| Defects r'dw'y, etc. | 214 | $140,277 | 14 | 377 |
| Defects equipment.. | 686 | 535,834 | 16 | 213 |
| Negligence. | 75 | 98,930 | 11 | 119 |
| Unfores'n obstructn | 90 | 136,191 | 109 | 153 |
| Malicious obstruction of track, etc. | 20 | 60,234 | 7 | 60 |
| Misc. causes. | 236 | 243,006 | 33 | 470 |
| Total | 1,321 | $1,214,472 | 190 | 1,392 |
| Grand total | 2,760 | $2,439,073 | 400 | 3,377 |

Derailment No. 10 was the wrecking of a passenger train while crossing a trestle, in consequence of the bridge giving way. Eighty-eight persons were killed, the engine and all of the cars of the train except two being swept down by the flood which wrecked the bridge. According to the report of the railroad company, the bridge was knocked down by floating wreckage, which struck it while the train was on the bridge. The report says:

A volume of water more than 20 ft. deep came down an arroya which is usually dry, filling the channel and overflowing the banks. It came with such rapidity as to displace the county wagon bridge situated about 1,000 ft. up the stream, which wagon bridge was thrown against the railroad bridge with such violence as to force it from its bearings at the very time the train was crossing the stream.

There was no water flowing in this arroya when two trains passed over the same bridge less than one hour before the catastrophe, and it was not raining at this point at the time the wreck occurred. In the river into which this arroya empties, half a mile from the bridge, the flow of water below the confluence was 40 cu. ft. per second on the morning before the disaster, and it was 1,000 cu. ft. per second on the morning after. In the interval it had reached a maximum of 4,000 cu. ft. per second. The road has been operated for 33 years and the permanent way has been on practically the same grade and the same alinement across this arroya during all this time. The bridge that was washed away was in thoroughly good condition immediately preceding the accident. The conductor who was in charge of the train had served the company in that capacity 22 years and the engineman 21 years.

Collision No. 23, killing 63 persons, occurred in daylight. The conductor and the engineman of the westbound train forgot a meeting order which had been delivered to them about 35 minutes before. The engineman was killed in the collision, but there is satisfactory evidence that he had correctly read the order which he had received. He is said to have read the order to the fireman, but this appears to have done no good. The fireman was killed. The conductor simply forgot that he had the order. The conductor thinks that he read the order to the flagman, as he is required by rule to do, but the flagman says that he did not. These two trains were running on long-established schedules and had often met at the station which was prescribed in this case, on orders similar to this one. There were no other trains on this part of the road at this time. The most of the victims of the wreck were passengers riding in two passenger cars of comparatively light construction in the eastbound train, which were between a large and heavy baggage car and a heavy vestibuled passenger car. Behind this vestibuled car were three sleeping cars. The negligent conductor and engineman were men of long experience, good records, and excellent characters.

Collision No. 24 occurred to a passenger train, running at high speed, near a station where the switches had no interlocking or distant signals.

Collision No. 11 was due to the running of a part of a freight train on the main line from one station to another without having the right to the track; and the error which led to this movement was a mistake in or misunderstanding of hand signals on the part of a brakeman and an engineman. The engineman, who had had only four months' experience on this road, though he had served several years on other roads, absconded the day after the collision. The brakeman had had only five months' experience as such, though he had worked for the same company in a bridge-repair gang for five years. It appears that not only did the men in charge of this train disobey the rule against running from station to station without an order from the despatcher, but also neglected to send a flagman in either direction. The conductor of the train had had seven months' experience as such on this road and 20 years' experience elsewhere. The fireman of this freight train, who had served five years, part of the time as extra engineman, was the only person on the train who had been in the train service of the company more than seven months.

Collision No. 5 occurred in the daytime and at a point less than one-fourth mile beyond a block-signal station, the foremost train having stopped at that point to take water. As soon as this train had passed the block-signal station (station B) the signalman (station agent) gave the prescribed telegraphic signal to the next block station in the rear (station A), and a following passenger train was started from A in about two minutes thereafter. It reached B in about four minutes, or six minutes after the foremost train stopped at the water tank. The operator at B appears to have telegraphed to A without first putting his own outdoor signal in the stop position. This operator was a man of 11 years' experience, with a good record.

The rear flagman of the foremost train, who, according to the rule, should have signaled the following train in season to stop it before it should collide with his own train, did not do so, going back only a short distance, and that apparently after some delay. This flagman was 23 years old and had been in the service seven months.

Derailment No. 4 occurred on a grade of about 2 per cent., some 10 miles long. The train consisted of 36 cars, with air-brakes in service on 25 cars. The inspectors reported all in good order at the starting point at the head of the grade. The control of the speed of the train was intrusted to the conductor and brakemen, the engineman being required by rule to use air-brakes only in emergencies. After running two or three miles at high speed the train broke apart behind the 19th car. This break is believed to have been due to the breaking of a wheel, and most of the rear part of the train was wrecked at this point. The forward portion ran several miles farther, when the engine was derailed at a curve and the whole of the cars were wrecked. It is believed that the air-brakes were not operative behind the first car, as there is some circumstantial evidence that none of them acted as they should have done, automatically, when the break occurred. It is supposed, therefore, that the angle cock at the rear end of the first car had been closed by some means not discovered. Both conductor and engineman were killed.

Collision No. 2, like No. 5, was due to a failure in block working. Collision No. 7 occurred on a line where block signaling appears to be in force, but it was "permissive blocking." It appears to be clear that the fault lies with the engineman of the second train. The men on this train had been on duty 16½ hours.

Collision No. 13 illustrates the complicated nature of some of the rules under which trains are run on single-track lines. This case may be described as follows: Extra 324 north and fourth 56 south met in collision north of E, killing three men and damaging two engines and 21 cars. The stations and distances on this line are as follows:

| | Miles. | |
|---|---|---|
| A | 0 | North |
| B | 7 | |
| C | 12 | |
| D | .. | |
| E | 25 | |
| F | 34 | |
| G | 70 | |

There were four sections of train No. 56 from G to E, and there were to have been three sections from E to A. Third 56 was turned at E, where it set off its cars, and engine and crew started for G as an extra before extra 324 arrived. At D extra 324 received an order reading, "Extra 324 has right of track against third 56 D to E. Extra 325 has right of track against third 56 B (E. D. T.) to D." Upon arriving at E, engineman of extra 324 received a meet order with train No. 50 at F; inquired if third 56 had arrived, but asked nothing about signals, and when informed that third 56 had been there, proceeded without any orders. He had met second 56 at C and noted that it carried signals, which plainly showed that there would be a third section of train to C; and from the order that he received at D he knew that extra 325, which was following him, had right of track against third 56 to D. The crew of extra 324 therefore knew that there would be three sections of 56 south of E, and also knew that they had met but two sections. Operator did not notify crew of extra 324 that third 56 had arrived carrying signals, and conductor of the train left his work to the flagman, making no effort to stop train when he knew that he had no right to proceed beyond E.

Collision No. 19 was due to a combination of causes, one of which was unusual. The conductor and engineman of a westbound train had orders to meet two eastbound passenger trains at a certain station, where the westbound did not stop. On approaching that station the engineman received from the operator a go-head signal by flag, and took this for a clear block-signal, superseding the telegraphic meeting order which he

held from the despatcher. The conductor was busy collecting tickets and the meeting order dropped out of his mind until he reached the station. While passing he imagined he saw two eastbound passenger trains on the side track, though in fact there was only one such train there. The operator who gave the clear flag signal had been stationed at that point temporarily for the purpose of block-signaling trains running in the same direction, without regard to despatcher's orders concerning the movement of trains running toward each other.

Collisions, 4, 6, 8, 9, 10, 16 and 22 were due to mistakes or forgetfulness in connection with telegraphic orders or in reading time-tables. In collision No. 3 the men at fault had been on duty 18 hours.

## Railroad Law.

The following abstracts are taken from recent decisions of the Supreme Court and the Federal Circuit Courts in railroad cases:

*Connecting Carriers.*—A special contract by a railroad company to transport a through shipment by a vessel of a connecting carrier sailing on a designated day will be deduced from the acceptance of a through rate for shipment "to be forwarded" via such a steamer, which rate was quoted with notice that it was of vital importance that the shipment should be transported promptly to enable the shipper to fulfill a contract for the sale of the goods at destination which required prompt delivery, and such a contract is binding though entered into by "a general eastern agent" of the receiver in control of the contracting carrier. (Sup. Ct. U. S.) Northern Pacific Ry. Co. vs. American Trading Co., 25 Sup. Ct. 84.

*Exercise of Eminent Domain by Lessee of Franchise.*—The lessee of a telegraph company cannot as such lessee exercise the right of eminent domain possessed by its lessor. (Sup. Ct. U. S.) Western Union Telegraph Co. vs. Pennsylvania Ry. Co., 25 Sup. Ct. 150.

*Relationship as Disqualification of Receiver.*—When the appointment of a person as one of the receivers of a railroad company in foreclosure proceedings is asked by the trustees in the mortgages and other creditors and favored by practically all of the parties in interest and is opposed by only a small minority of the bondholders who make no charge against his integrity or ability and he is specially fitted for the position by reason of his familiarity with the property and its operation the appointment will not be refused because of his relationship to certain of the large stockholders and bondholders nor because he had been an officer and director of the company. (U. S. Cir. Ct. Va.) Bowling Green Trust Co. vs. Virginia Passenger & Power Co., 133 Fed. Rep. 186.

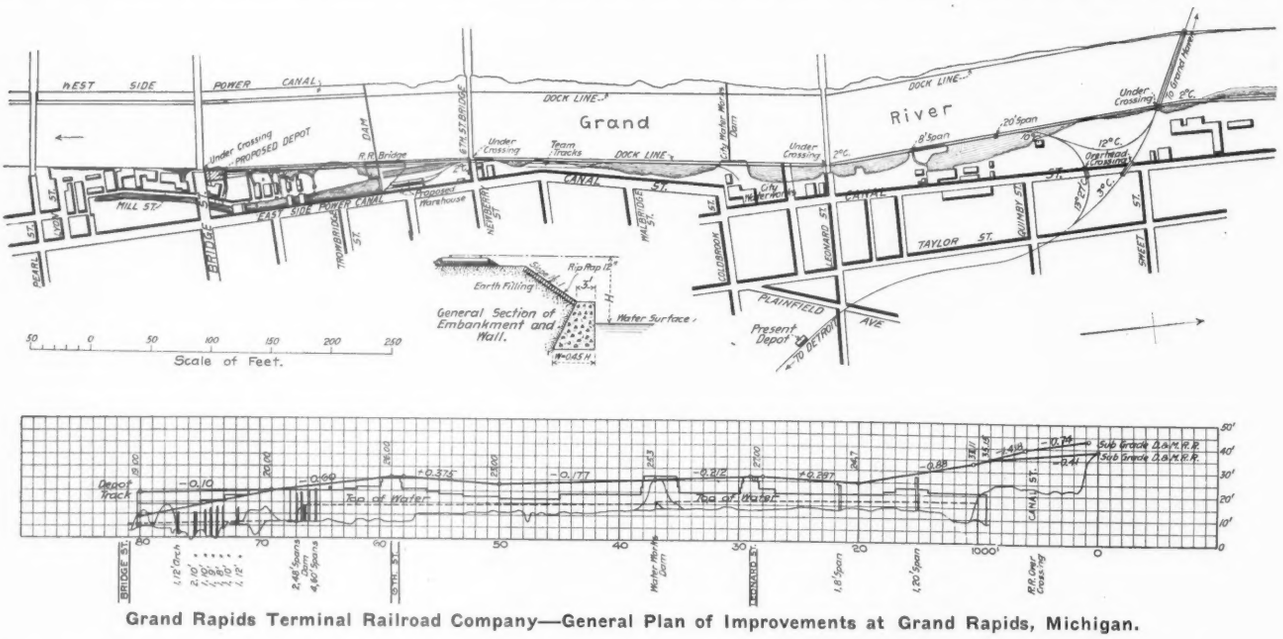
*Telegraph Company's Entry on Railroad Right of Way.*—Telegraph companies were not granted a right to enter upon and occupy railroad rights of way without consent by acts of Congress giving telegraph companies the right to construct, maintain and operate telegraph lines through and over the public domains and "over and along any of the military or post roads of the United States"; the purpose of that act being to withdraw interstate commerce by telegraph from state interference. (Sup. Ct. U. S.) Western Union Telegraph Co. vs. Pennsylvania R. R. Co., 25 Sup. Ct., Rep. 183.

## Grand Trunk Terminal Improvements at Grand Rapids.

The present passenger and freight station of the Detroit, Grand Haven & Milwaukee Railway at Grand Rapids, Mich., being about 1¾ miles from the center of the manufacturing and business district of the city, it was decided last July that the line should be extended into this district. For this purpose the Grand Rapids Terminal Railroad Company was organized, and an ordinance secured from the City Council of Grand Rapids permitting a line to be built from a point on the Detroit, Grand Haven & Milwaukee just east of the bridge crossing Grand River, southerly and adjoining a dock line recently established on the east bank of the river to Bridge street, a distance of about 8,000 ft. The ordinance also provided for a further extension of the line under Bridge street and about 1,000 ft. further south, to form connection with industries established there. To build an embankment adjoining the dock line as established, it was necessary to build a protection wall in the river, about 7,000 ft. long, the face of which should be the dock line. The ordinance provided that at street crossings and across city property this wall should be built to grade elevation. Elsewhere, on the score of economy, it is but a few feet above the ordinary stage of water in the river. The height of this protection wall thus varies from about 7 ft. to 20 ft. After the completion of the embankment it is to be further protected to high-water mark by hand-placed riprap, as shown on the sketch of the general section of embankment and wall.

Bridge and Canal streets are the most important in the city. At the former the city has recently completed a concrete arch bridge about 500 ft. long. In order to pass under the approach to this structure, the track extending below Bridge street has to be depressed considerably. The elevation of the roadway at Bridge street is 28 ft.; the floor of the passenger station will be at about that same elevation, while the station tracks will be 21 ft. The elevation of the depressed track under Bridge street will be 10½ ft. at that point. It will therefore be necessary for the Terminal Company to build in addition to the dock line wall, another wall supporting the filling for the station tracks, which will lie above the depressed track for about 1,000 ft.; also another wall protecting the property to the east and north of the company's property, on account of the limited space that could be acquired for track purposes.

The crossing of the power canal and dam will require four 60-ft. and two 48-ft. double-track, through-girder spans. Between the dam and Bridge street there will be eight different arches from 8 ft. to 12 ft. span and of sufficient length to carry three tracks, to serve as tail-races for the various industries situated on the canal and receiving power therefrom. The masonry will all be concrete and will amount to over 16,500 cu. yds.







Grand Rapids Terminal Railroad Company—General Plan of Improvements at Grand Rapids, Michigan.

The foregoing information was obtained from Mr. R. S. Logan, Assistant to Second Vice-President of the Grand Trunk.

## Pig Iron Production in 1904.

*The Bulletin* of the American Iron & Steel Association prints the following statistics of pig iron production in the United States during 1904.

The total production was 16,497,033 gross tons, against 18,009,252 tons in 1903, 17,821,307 tons in 1902, 15,878,354 tons in 1901, 13,789,242 tons in 1900, 13,620,703 tons in 1899, and 11,773,934 tons in 1898. The following

able gives the half-yearly production in the last four years in gross tons.

| | Periods | | |
|---|---|---|---|
| | First half. | Second half. | Total. |
| 1901 | 7,674,613 | 8,203,741 | 15,878,354 |
| 1902 | 8,808,574 | 9,012,733 | 17,821,307 |
| 1903 | 9,707,367 | 8,301,885 | 18,009,252 |
| 1904 | 8,173,438 | 8,323,595 | 16,497,033 |

The production of 1904 was 1,512,219 tons less than that of 1903. The production in the second half of 1904 was 150,157 tons more than that of the first half. The causes of the decline in production in 1904 as compared with 1903 are so well known that they need not be dwelt upon in this connection, but it is worthy of mention that the last four months of 1904 showed great and steadily increasing activity in production. This rate of production was continued and exceeded in January of the present year.

The production of Bessemer and low-phosphorus pig iron in 1904 was 9,098,659 tons, against 9,989,908 tons in 1903, a decrease of 891,249 tons. The production of basic pig iron in 1904, not including charcoal of basic quality, was 2,483,104 tons, against 2,040,726 tons in 1903, an increase of 442,378 tons. The production of charcoal pig iron in 1904 was 337,529 tons, against 504,757 tons in 1903 and 378,504 tons in 1902. The production in 1904 was 167,228 tons less than in 1903 and 40,975 tons less than in 1902. The production of spiegeleisen and ferromanganese in 1904 was 219,446 tons, against 192,661 tons in 1903. The production of ferromanganese alone in 1904 amounted to 56,076 tons. One company produced 946 tons of ferrophosphorus in 1904. A significant feature of the above statistics is the increased production of basic pig iron in a year of generally reduced production.

*Total Stocks of Unsold Pig Iron.*

| States. | Gross tons of 2,240 lbs. 1903 June 30. | 1903 Decembr 31. | 1904 June 30. | 1904 Decembr 31. |
|---|---|---|---|---|
| Mass. and Conn. | 477 | 3,452 | 3,142 | 1,451 |
| New York | 4,895 | 12,932 | 26,517 | 23,957 |
| New Jersey | 2,100 | 9,892 | 14,959 | 9,048 |
| Pennsylvania | 24,413 | 106,472 | 114,477 | 55,538 |
| Md. and Va. | 16,756 | 25,823 | 69,880 | 31,032 |
| N. C., Ga. & Tex. | 2,416 | 10,226 | 31,576 | 14,495 |
| Alabama | 30,619 | 234,828 | 110,814 | 112,673 |
| Ky. and W. Va. | 5,316 | 16,422 | 2,315 | 15,936 |
| Tennessee | 11,408 | 22,019 | 15,781 | 5,266 |
| Ohio | 20,073 | 72,189 | 99,942 | 38,500 |
| Mich. and Minn. / Ill. and Wis. / Mo. and Colo. / Pacific States | 7,828 | 77,183 | 133,851 | 100,896 |
| Total | 126,301 | 591,438 | 623,254 | 408,792 |

The stocks of pig iron which were unsold in the hands of manufacturers or which were under their control in warrant yards and elsewhere at the close of 1904, and were not intended for their own consumption, amounted to 408,792 tons, against 623,254 tons on June 30, 1904, and 591,438 tons on Dec. 31, 1903. The American Pig Iron Storage Warrant Company held 55,350 tons of pig iron in its yards on Dec. 31, 1904, of which 17,700 tons, included above, were reported to us as being still controlled by the makers, leaving 37,650 tons in other hands. Adding this 37,650 tons to the 408,792 tons noted above gives us a total of 446,442 tons that were on the market at the close of 1904.

The whole number of furnaces in blast on Dec. 31, 1904, was 261, against 216 on June 30, 1904, and 182 on Dec. 31, 1903. The number of furnaces in blast at the end of 1904 was 45 larger than on June 30 of the same year and 79 larger than on Dec. 31, 1903.

## Ex-President John M. Hall.

With the death of ex-President John M. Hall, of the New Haven, there passes away almost the last of the old-fashioned railroad presidents who lived so late as to be in charge of a great railroad system. It was a type of railroad administration that stood by itself, marked by integrity, economy, conservatism and fidelity to its tasks, but not by progressiveness and keen forecast. In the case of ex-President Hall the personality

John M. Hall.

was the more vivid because he stood between two contrasted administrations, those of Presidents C. P. Clark and C. S. Mellen, each, in its way radical, even dramatic.

Ex-President Hall was born in Willimantic, Conn., Oct. 16, 1841, in a family that struck back its roots to rich Puritan stock. He received a public school education, tried business but dropped it to secure a liberal education, passed through Yale in the class of 1866 with high literary honors, studied law at Columbia and practiced it at Willimantic, served five terms in the Connecticut legislature and was appointed Judge of the Superior Court of Connecticut in 1889. He was eloquent in speech, well versed in law and, as a Republican party leader, was classed as a "practical" politician; but on the bench he threw politics behind and in the Connecticut deadlock of 1890-2 rendered a decision directly adverse to his party's interest. President Clark, immersed in large schemes of expansion, needed a man in his company who knew Connecticut law, men, politics and affairs. And, in 1893, he induced Judge Hall to surrender what was sure promotion to the supreme bench of the state for the more arduous and responsible but also much higher paid duties of First Vice-President of the New Haven Company. He remained vice-president until 1899, somewhat specializing his work on state legislation, and late in that year succeeded President Clark, continuing in office until the succession of President Mellen in 1903.

The four years' administration of President Hall spanned a transition period in the history of the New Haven corporation. President Clark, with what was called radicalism then but has lost that title now, had carried through consolidation and created a territorial monopoly in southern New England; but the problem of operation had yet to be worked out and was to wait for President Mellen. The gap between the two Presidents Hall was called upon to fill. It needed a trained railroad operator of the up-to-date stamp and that President Hall was not. He worked faithfully, gave vigilant attention to details, was zealous for the interests of the road and was a close and rigid economist. In the cause of economy he even one year declared independence of the Connecticut lobby whose bills for a preceding session of the legislature he had remorselessly pared down; but an initial defeat at the state capital on an important measure brought his corporation to its knees. It was not until near the close of his administration that he awoke to the needs of his company in the direction of new equipment and the development of through freight business. Then, with the aid of the new Vice-President, Mr. Todd, he made the first important beginnings in the purchase of new locomotives and cars, the development of coal traffic, acquirement of water frontage at Boston and the exchange of high class westward freight from non-competitive points for long hauls of eastward freight to competitive stations.

In one direction, however, the administration of President Hall was advanced, not to say radical. Believing in the policy of acquiring electric roads he pushed still further the theory and practice of President Clark. The main features of his electric policy were the electrification of lines of his system east of Providence in competition with the trolleys; and, more novel, the self parallelism of the Norwich & Worcester division by connected electric railways almost reaching between the two cities. The scheme has not, in itself, yet proved a financial success. But with its liberal charter and under its new title of "Consolidated Railway Company" it has become the basic holding corporation in which most of the electric properties of the New Haven Company have been merged.

The trying labor troubles of the New Haven Company two years ago fell upon President Hall when in poor health, hastened his retirement, and, undoubtedly, his death. He withdrew from the presidency a few months later after a comparatively brief tenure of office not marked by great achievement but by tireless industry, single-

*TOTAL PRODUCTION OF PIG IRON.*

| States. | Blast furnaces: In blast June 30, 1904. | Dec. 31, 1904. In. | Out. | Total. | Production, gross tons of 2,240 lbs., (includes spiegeleisen): First half 1904. | Second half 1904. | Total for 1904. |
|---|---|---|---|---|---|---|---|
| Massachusetts | 1 | 1 | 1 | 2 | 1,242 | 1,907 | 3,149 |
| Connecticut | 1 | 2 | 1 | 3 | 4,325 | 4,597 | 8,922 |
| New York | 10 | 12 | 10 | 22 | 250,980 | 354,729 | 605,709 |
| New Jersey | 5 | 5 | 7 | 12 | 121,294 | 141,000 | 262,294 |
| Pennsylvania | 82 | 108 | 50 | 158 | 3,713,867 | 3,930,454 | 7,644,321 |
| Maryland | 3 | 4 | 2 | 6 | 135,416 | 158,025 | 293,441 |
| Virginia | 12 | 12 | 14 | 26 | 186,037 | 124,489 | 310,526 |
| North Carolina | .. | .. | 1 | 1 | 40,508 | 29,648 | 70,156 |
| Georgia | 3 | 2 | 2 | 4 | | | |
| Alabama | 25 | 25 | 24 | 49 | 800,256 | 653,257 | 1,453,513 |
| Texas | 1 | 1 | 3 | 4 | 3,834 | 1,696 | 5,530 |
| West Virginia | 4 | 4 | .. | 4 | 103,153 | 167,792 | 270,945 |
| Kentucky | 2 | 3 | 4 | 7 | 17,516 | 19,590 | 37,106 |
| Tennessee | 11 | 10 | 12 | 22 | 165,883 | 136,213 | 302,096 |
| Ohio | 31 | 43 | 17 | 60 | 1,540,743 | 1,437,186 | 2,977,929 |
| Illinois | 13 | 12 | 9 | 21 | 798,221 | 857,770 | 1,655,991 |
| Michigan | 4 | 6 | 6 | 12 | 138,744 | 94,744 | 233,225 |
| Wisconsin | 3 | 6 | .. | 6 | 104,437 | 105,967 | 210,404 |
| Minnesota | .. | 1 | .. | 1 | | | |
| Missouri | 2 | 2 | .. | 2 | | | |
| Colorado | 2 | 2 | 3 | 5 | 46,982 | 104,794 | 151,776 |
| Oregon | .. | .. | 1 | 1 | | | |
| Washington | .. | .. | 1 | 1 | | | |
| Total for 1904 | 216 | 261 | 168 | 429 | 8,173,438 | 8,323,595 | 16,497,033 |
| Total for 1903 | 320 | 182 | 243 | 425 | 9,707,367 | 8,301,885 | 18,009,252 |

hearted devotedness to the welfare of his corporation and ideals well nigh Puritan of official integrity.

## Development and Use of High-Speed Tool Steel.*

In preparing high-speed steel ready for use the process may be divided principally into three stages: forging, hardening and grinding. It is, of course, very desirable that high-speed steel should be capable of attaining its maximum efficiency and yet only require treatment of the simplest kind, so that an ordinarily skilled workman may easily deal with it, otherwise the preparation of tools becomes an expensive and costly matter, and materially reduces the advantages resulting from its use. Fortunately, the treatment of the rapid steel produced by the author's firm is of the simplest; simpler, in fact, than ordinary carbon steels or the old self-hardening steels, as great care had to be exercised in the heating of the latter steels, for if either were heated above a blood-red heat, say 1,600 deg. F., the danger of impairing their efficiency by burning was considerable; whereas with the high-speed steel, heating may be carried to a much higher temperature, even up to melting point, it being practically impossible to injure it by burning. The steel may be raised to a yellow heat for forging, say 1,850 deg. F., at which temperature it is soft and easily worked into any desired form, the forging proceeding until the temperature lowers to a good red heat, say 1,500 deg. F., when work on it should cease and the steel be reheated.

In heating a bar of high-speed steel preparatory to forging (which heating is best done in a clear coke fire) it is essential that the bar be heated thoroughly and uniformly, so as to insure that the heat has penetrated to the center of the bar, for if the bar be not uniformly heated, leaving the center comparatively cold and stiff, while the outside is hot, the steel will not draw or spread out equally, and cracking will probably result. A wise rule in heating is to "hasten slowly."

It is not advisable to break pieces from the bar while cold, the effect of so doing tending to induce fine end cracks to develop which ultimately may extend and give trouble, but the pieces should be cut off while the bar is hot, then be reheated as before and forged to the shape required, after which the tool should be laid in a dry place until cold.

The temperature for hardening high-speed steel varies somewhat according to the class of tool being dealt with.

When hardening, turning, planing or slotting tools, and others of similar class, the point or nose of tool only should be gradually raised to a white melting heat, though not necessarily melted, but even should the point of the tool become to a more or less extent fused or melted no harm is done. The tool should then be immediately placed in an air blast and cooled down, after which it only requires grinding and is then ready for use.

Another method of preparing the tools is as follows:

Forge the tools as before, and when quite cold grind to shape on a *dry* stone or *dry* emery wheel, an operation which may be done with the tool fixed in a rest and fed against the stone or emery wheel by a screw, no harm resulting from any heat developed at this stage. The tool then requires heating to a white heat, but just short of melting, and afterwards completely cooling in the air blast. This method of first roughly grinding to shape also lends itself to cooling the tools in oil, which is specially efficient where the retention of a sharp edge is a desideratum, as in finishing tools, capstan and automatic lathe tools, brass-workers' tools, etc.

In hardening where oil cooling is used, the tools should be first raised to a white heat, but without melting, and then cooled down either by air blast or in the open to a bright red heat, say 1,700 deg. F., when they should be instantly plunged into a bath of rape or whale oil, or a mixture of both.

Referring to the question of grinding tools, nothing has yet been found so good for high-speed steels as the wet sandstone, and the tools ground thereon by hand pressure, but where it is desired to use emery wheels it is better to roughly grind the tools to shape on a dry emery wheel or dry stone *before* hardening. By so doing the tools require but little grinding after hardening, and only slight frictional heating occurs, but not sufficient to draw the temper in any way, and thus their cutting efficiency is not impaired. When the tools are ground on a wet emery wheel and undue pressure is applied, the heat generated by the great friction between the tool and the emery wheel causes the steel to become hot, and water playing on the steel while in this heated condition tends to produce cracking.

With regard to the hardening and tempering of specially formed tools of high-speed steel, such as milling and gear cutters, twist drills, taps, screwing dies, reamers, and other tools that do not permit of being ground to shape after hardening, and where any melting or fusing of the cutting edges must be prevented, the method of hardening is as follows:

A specially arranged muffle furnace heated either by gas or oil is employed, and consists of two chambers lined with fireclay, the gas and air entering through a series of burners at the back of the furnace, and so under control that a temperature up to 2,200 deg. F. may be steadily maintained in the lower chamber, while the upper chamber is kept at a much lower temperature.

Before placing the cutters in the furnace it is advisable to fill up the hole and keyways with common fireclay to protect them.

The mode of procedure is now as follows:

The cutters are first placed upon the top of the furnace until they are warmed through, after which they are placed in the upper chamber and thoroughly and uniformly heated to a temperature of about 1,500 deg. F., or, say, a medium red heat, when they are transferred into the lower chamber and allowed to remain therein until the cutter attains the same heat as the furnace itself, viz., about 2,200 deg. F., and the cutting edges become a bright yellow heat, having an appearance of a glazed or greasy surface. The cutter should then be withdrawn while the edges are sharp and uninjured, and revolved before an air blast until the red heat has passed away, and then while the cutter is still warm—that is, just permitting of its being handled—it should be plunged into a bath of tallow at about 200 deg. F., and the temperature of the tallow bath then raised to about 520 deg. F., on the attainment of which the cutter should be immediately withdrawn and plunged in cold oil.

Of course there are various other ways of tempering, a good method being by means of a specially arranged gas-and-air stove into which the articles to be tempered are placed, and the stove then heated up to a temperature of from 500 deg. F. to 600 deg. F., when the gas is shut off and the furnace with its contents allowed to slowly cool down.

Another method of heating tools is by electrical means, and by which very regular and rapid heating is obtained; and where electric current is available, the system of electric heating is quick, reliable and economical.

One method adopted of electrically heating the points of tools and the arrangement of apparatus is shown in Fig. 1. It consists of a cast-iron tank, of suitable dimensions, containing a strong solution of potassium carbonate together with a dynamo, the positive cable from which is connected to the metal clip holding the tool to be heated, whilst the negative cable is connected direct on the tank. The tool to be hardened is held in a suitable clip to insure good contact. Proceeding to harden the tool the action is as follows:

The current is first switched on, and then the tool is gently lowered into the solution to such a depth as is required to harden it. The act of dipping the tool into the alkaline solution completes the electric circuit and at once sets up intense heat on the immersed part. When it is seen that the tool is sufficiently heated the current is instantly switched off, and the solution then serves to rapidly chill and harden the point of the tool, so that no air blast is necessary.

Another method of heating the point of tools is by means of the electric arc, the heating effect of which is also very rapid in its action. The general arrangement and form of the apparatus here employed being as illustrated in Fig. 2.

The tool under treatment and the positive

*The shaded portion shows the area of electrical contact. The negative electrode should be kept moving over this surface without approaching too near the cutting edge of the tool.*

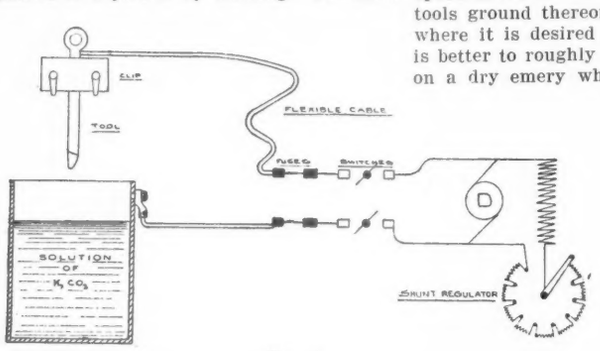



Fig. 1.

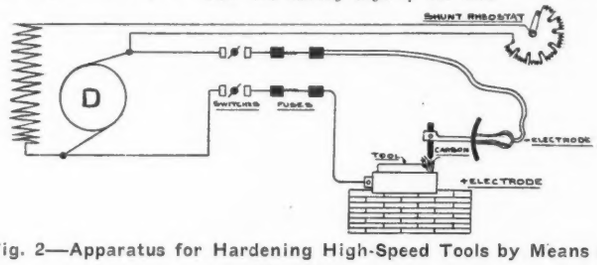



Fig. 2—Apparatus for Hardening High-Speed Tools by Means of an Electric Arc.

*Extract of a paper by J. M. Gledhill at the New York meeting of the Iron and Steel Institute, October, 1904.

electrode are placed on a bed of non-conducting and non-combustible material and the arc started gradually at a low voltage and steadily increased as required, by controlling the shunt rheostat, care being taken not to obtain too great a heat and so fuse the end of the tool. The source of power in this case is a motor generator consisting of a continuous-current shunt-wound motor at 220 volts, coupled to a continuous-current shunt-wound dynamo at from 50 to 150 volts. Arcs from 10 to 1,000 amperes are then easily produced and simply and safely controlled by means of the shunt rheostat.

Electricity is also a very efficient and accurate means of tempering such forms of tools as milling, gear, hobbing and other similar cutters, also large hollow taps, hollow reamers, and all other hollow tools made of high-speed steel, where it is required to have the outside or cutting portion hard, and the interior soft and tenacious, so as to be in the best condition to resist the great stresses put upon the tool by the resistance of the metal being cut, and which stresses tend to cause disruption of the cutter if the hardening extends too deep.

By means of the apparatus illustrated in Fig. 3, this tempering or softening of the interior can be perfectly and quickly effected, thus bringing the cutter into the best possible condition to perform rapid and heavy work.

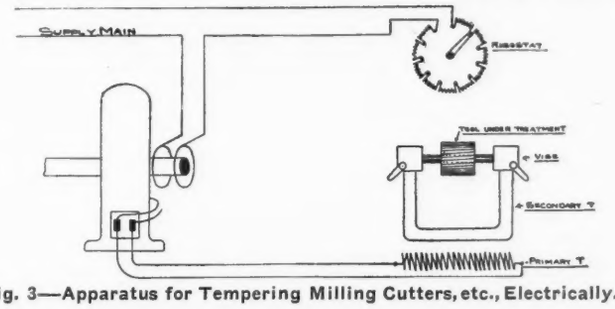



Fig. 3—Apparatus for Tempering Milling Cutters, etc., Electrically.

Tempering of hollow cutters, etc., is sometimes carried out by the insertion of a heated rod within the cutter and so drawing the temper, but this is not entirely satisfactory or scientific, and is liable to induce cracking by too sudden heat application, and further because of the difficulty of maintaining the necessary heat and temperature required, and afterwards gradually lowering the heat until the proper degree of temper has been obtained. In electrical tempering these difficulties are overcome, as the rod is placed inside the cutter quite cold, and the electric current gradually and steadily heats up the rod to the correct temperature as long as is necessary, and the current can be gradually reduced until the articles operated on are cold again, and consequently the risk of cracking by too sudden expansion and contraction is reduced very greatly. The apparatus used is very simple, as will be seen by reference to the sketch. It consist of a continuous-current shunt-wound motor directly coupled to a single-phase alternating-current dynamo of the revolving field type, giving 100 amperes at 350 volts, 50 cycles per second, the exciting current being taken from the works supply main.

The power from the alternator is by means of a stepdown transformer, reduced to current at a pressure of two volts, the secondary coil of the transformer consisting of a single turn of copper of heavy cross-section, the extremities of which are attached to heavy copper bars carrying the connecting vices holding the mandrel upon which the cutter to be tempered is placed. The secondary induced current, therefore, passes through a single turn coil, through the copper bars and vices and mandrel.

Although the resistance of the complete circuit is very low, still, owing to the comparatively high specific resistance of the iron mandrel, the thermal effect of the current is used up in heating the mandrel, which gradually attains the required temperature, slowly imparting its heat to the tool under treatment until the shade of the oxide on the tool satisfies the operator.

The method adopted to regulate the heat of the mandrel is by varying the excitation current of the alternator by means of the rheostat. An extremely fine variation and perfect heat control is easily possible by this arrangement.

Having touched upon the development and thermal treatment of high-speed steel, it will now be opportune to refer to its practical use and to some of the most recent work done with it. It is sometimes contended that on the whole not much advantage or economy results from using high-speed steel, but it is easy to prove very greatly to the contrary, and the author proposes to give some figures and facts as to its use and advantage, not only by knowledge gained from results of his own firm, but also from information supplied by many important engineering establishments as to their present workshop practice, and for which he is indebted.

That great economy is effected is beyond all doubt, from whichever point of view the question is looked at; for it is not only

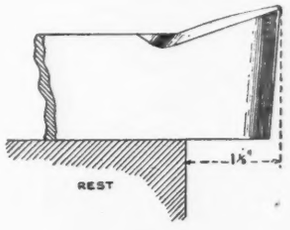



Fig. 4.

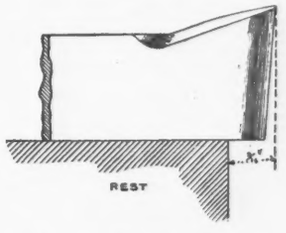



Fig. 5.

rapidity of cutting that counts, but the output of machines is correspondingly increased, so that a greater production is obtained from a given installation than was possible when cutting at low speeds with the old tool steel, and the work is naturally produced at a correspondingly lower cost, and of course it follows from this that in laying down new plant and machines the introduction and use of high-speed steel would have considerable influence in reducing expenditure on capital account.

It has also been proved that high-speed cutting is economical from a mechanical standpoint, and that a given horse-power will remove a greater quantity of metal at a high speed than at a low speed, for although more power is naturally required to take off metal at a high than at a low speed (by reason of the increased work done) the increase of that power is by no means in proportion to the large extra amount of work done by the high-speed cutting, for the frictional and other losses do not increase in anything like the same ratio as a high-cutting speed is to a low-cutting speed. A brief example of this may be given in which the power absorbed in the lathe was accurately measured electrically.

Cutting on hard steel, with three-sixteenths inch depth of cut, one-sixteenth inch feed and speed of cutting 17 ft. per min., a power of 5.16 h.p. was absorbed, and increasing the cutting speed to 42 ft. per min., the depth of cut and feed being the same, there was a saving in power of 19 per cent. for the work being done.

Another experiment with depth of cut three-eighths inch and traverse one-sixteenth inch compared with one-sixteenth inch traverse and three-sixteenths inch depth of cut, showed a saving in power of as much as 28 per cent., and still proceeding with a view of increasing the weight of metal removed in a given time the feed was doubled (other conditions being the same), and a still further saving of power resulted. In a word, as in the majority of things, so it is with rapid cutting, the more quickly work can be produced the cheaper the cost of production

Again, as regards economy there is not only a saving effected on the actual machine work, but since the advent of high-speed cutting it is now possible, in many instances, to produce finished articles from plain rolled bars, instead of following the old practice of first making expensive forgings and afterwards finishing them in the machine. By this practice not only is the entire cost of forging abolished, but the machining on the rolled bar can be carried out much quicker and cheaper in suitably arranged machines, quicker even than the machining of a forging can be done.

Many wonderful examples in proof of this can be given. Taking the two articles illustrated below: These were machined from plain rolled bars with high-speed steel in 45 min. and 13 min. respectively, as against 3¾ hrs. and 1¾ hrs. when made from forgings and using ordinary tool steel.

Another remarkable sample of the gain resulting from the use of high-speed cutting from rolled bars is illustrated in the case of securing bolts, made by the author's firm, for armor plates. Formerly where forgings were first made and then machined with ordinary self-hardening steel, a production of eight bolts per day of ten hours was usual. With the introduction of rapid-cutting steel, 40 similar bolts from the rolled bar are now produced in the same time, thus giving an advantage of five to one in favor of quick cutting, and also in addition abolishing the cost of first rough forging the bolt to form; in fact, the cost of forging one bolt alone amounted to more than the present cost of producing to required form 12 such bolts by high-speed machining. The cutting speed at which these bolts are turned is 160 ft. per min., the depth of cut and feed being respectively three-quarters inch and one thirty-second inch, the weight of metal removed from each bolt being 62 lbs., or 2,480 lbs. in a day of 10 hrs., the tool being only ground once during such period of work, and from such an example as this it will be at once apparent what an enormous saving in plant and costs results. On the same principle the sleeves for these bolts are produced from bars, 60 being made in one day of 10 hrs., this being even a greater saving on the old system than the bolt example shows.

The lathe on which this work is done is a 12-in. lathe of special design and strength for rapid and heavy cutting, and has a link driving belt 7½ in. wide, running at a very high velocity and driven by its own motor, so that the power absorbed can always be observed whether the lathe is running idle or cutting.

Equally remarkable results are obtained

by operating on stock bars with high-speed milling cutters, and one example, among many, may be cited: Hexagon nuts for 3⅜ in. diameter bolts are made from rolled bars, the cutting speed of milling being 150 ft. per min., giving a production of 90 nuts per day, against 30 formerly. More than 90 nuts could have been produced had the machine been more powerful.

Rapid cutting with planing tools has also developed extensively, the old cutting speeds of 15 to 25 ft. per min. being now replaced by those of 50 to 60 ft. per min., and in some cases even as high as 80 ft. per min., and for the same reasons, as already described in lathe turning, the power absorbed does not increase in anything like the same proportion to the extra amount of work done, so that the wear and tear on the machine is not materially increased.

It was for some time not thought possible to plane at such high speeds on account of the tools coming into contact suddenly with the job and running risks of snapping off through shock, but where high-speed steel of proper quality is used this difficulty is overcome, and a good example or two of rapid planing may be quoted. Using a 7-ft. planing machine with two tools operating on forged steel of medium quality, the cutting speed, depth of cut and feed of each tool is respectively 54 ft., one-fourth inch, and one-eighth inch, the speed of reverse being 160 ft. per min.

Another striking example of high-speed planing on a large cast-iron turbine body was: Cutting speed 36 ft. per min., depth of cut 1.25 in., and feed 7 cuts per in., the tool cutting for 10 hrs. without necessitating grinding. Two tools were cutting, each taking a cut as described, the size of the planer being 14 ft. x 14 ft. x 30 ft.

The question of cutting angles for tools is an important one, and the author would advise all interested to peruse the paper written by Professor Nicolson, of Manchester, and read before the Institution of Mechanical Engineers at Chicago this year, and in which he states that the best cutting angle as deduced from the results of experiments is 75 deg. for steel and 80 deg. for cast iron. Of course these angles may with advantage be modified according to circumstances and the nature of any particular class of work.

Objections have been made against high-speed steel on the ground of its being brittle; but this is not the case where the steel has been properly annealed and the hardening confined to the cutting area, and sufficient support given to the tools when fixed in the machine.

An example of the great pressure-resisting powers of high-speed steel may be given.

When cutting forged steel of about 30 tons per sq. in. tensile strength and offering a resistance to cutting of about 100 tons per sq. in., a tool of 1¼ sq. in. section was used, taking a cut of seven-eighths inch in depth by one-fourth inch feed per revolution, equivalent to an area of metal under cut of 0.21875 sq. in., the cutting speed being 90 ft. per min., and removing 60¾ lbs. of metal per min., or the enormous weight of 4,010 lbs. per hr. The tool in this instance was projecting a distance of 1½ in. beyond the rest (see Fig. 4), and a calculation shows the stress on the tool to be as high as 78.5 tons per sq. in. In another case, cutting forged steel of 35 tons tensile strength and offering a resistance to cutting of 115 tons per sq. in., a 1¼-in. square tool being used, the diameter of forging was reduced by 1 in., equal to one-half inch depth of cut, while the tool advanced three-eighths inch every revolution, the cutting speed being 25 ft. per min. and removing 14¼ lbs. of metal per min. With the point of the tool projecting three-fourths inch beyond the rest, the tool successfully withstood a stress of 51.6 tons per sq. in. (See Fig. 5.)

Although in actual practice tools of much greater section would be used, the results clearly show that, if proper care be taken, tools of high-speed steel are quite capable of withstanding any pressure likely to be met in ordinary workshop practice.

A most important point to observe when taking heavy cuts is that of having the tools quite flat on the bottom side and supported as near as possible up to the extreme edge, as by so doing the pressures tending to break the tool are very considerably reduced. For example, the position of the tool as placed in the rest shown in Fig. 4 would cause a stress of something like 78.5 tons per sq. in. to be thrown on it, whereas when the overhang is reduced to one-half of the original distance, equal to nine-sixteenths inch, the stress is lowered to 14.27 tons per sq. in., a reduction of 80 per cent.

Perhaps one of the most unlooked-for developments in the use of high-speed steel has been the manufacture from it of twist drills, and it would be safe to say that in no other sphere has the new steel justified itself to a greater extent than in the operations of drilling and boring, as its powers in that respect have revolutionized completely modern workshop practice. It is now possible in many cases to drill holes through stacks of thin steel plates as quickly and economically as by punching them, thus avoiding the consequent liability to distress the material due to punching action.

The plates of torpedo and other boats, which are comparatively thin and of high tensile strength, can now be drilled in stacks with such facility that it is no longer necessary to punch the holes, whilst in many articles where it was formerly the practice to core in the holes, as, for example, in cylinder and other covers, or pipe flanges, etc., it is now cheaper and quicker to use high-speed steel and drill the holes out of the solid.

A considerable amount of doubt has been thrown from time to time on the inability to take finishing cuts with high-speed steel, and in the early stages of its development this contention was to a large extent justified, but experience and practice have brought the steel into line and rendered it possible to obtain an excellent finish at high speeds with tools suitably formed and properly arranged in the machines. Some very good examples of finished bright work at high speeds have been made mostly in semi-automatic machines, high-speed steel being used and *one* cut only taken, the surface finish being most excellent.

This finishing quality of high-speed steel is especially advantageous for tools used in automatic and capstan lathes, because it enables the work to be produced so very much more rapidly; and also, on account of the great resistance of the steel to wearing action, greater accuracy is insured.

As regards the quality of retaining a sharp edge, high-speed steel makes excellent razors, and will long retain without sharpening an extremely keen cutting edge. The author may add that it is thus now possible to those whose time is precious to indulge even in "high-speed shaving."

The author hopes that the few facts he has given as to the use and development of high-speed steel may indicate some of its uses and progress, but he can scarcely refrain from remarking that many are saying, and rightly so, "Yes! these results are very remarkable; but what of the machines to perform such prodigious work?" and this leads him to speak before concluding as to how one important development often leads up to another of even greater magnitude, and that is in this case the complete revolution in the design of machine tools to cope with the extraordinary increased cutting powers of the latest rapid cutting steels.

It is impossible that the design of machine tools can remain on the old lines, since the difference between them and the cutting powers of the steel is so abnormal, and a sphere of immense area for the redesigning of machine tools is opened out to the ingenuity of the world's engineers.

That much has been already done is admitted, but the work is naturally of such a nature that only time and experience will accomplish, gradually enabling as nearly as possible the relative powers of the steel and machines to be equated.

In the machine tool department of the author's firm, this branch of the subject of remodeling their tools has received the closest attention, and a type of their modern 18-in. center lathe for high-speed cutting may be mentioned. It is capable of exerting 65 h.p. equivalent to a belt width of 12 in., and with the aid of a variable speed motor a range of cutting speeds from 16 to 400 ft. per min. is possible, this comparing with an old-type 18-in. lathe having a belt of 4-in. width, and capable of exerting only about 12 h.p.

In a similar way the old types of planing, milling, drilling machines, etc., are all more or less obsolete, and new designs are already constructed to cope with work at speeds and feeds described in this paper.

It is indeed a pleasure to see the new type of machine tool operating with high-speed steel, and treating the work it has to turn out in such a businesslike way, throwing off shavings from steel and iron as one usually sees in turning wood, and imparting a life and energy to the whole establishment in remarkable contrast to the sleepy rate at which metals used to be turned and machined for so many years past, thus exerting an influence on everybody therein to get "a hustle" on that is positively exhilarating in its effects.

## Automatic Block Signals in Europe.

The report made by Mr. C. H. Platt for the International Railway Congress on automatic block signals was noted in the *Railroad Gazette* of Nov. 11, 1904. The report on this subject for all countries except America is by Mr. Margot, of the Paris-Lyons-Mediterranean, and it is printed in the last number of the *Bulletin* of the Congress, page 1613. In 1899 the P.-L.-M. had 24 miles equipped with automatic signals; since then, automatics have been erected on the Midi, of France, 26 miles; on the London & South Western, six miles; on the North Eastern of England, 10 miles; and on the Austrian Southern, nine miles. Comparing this short list (74 miles, including 26 miles additional on the P.-L.-M.) with the automatic signaling of America, the reporter devotes his chief attention to the question why other countries do not follow the American example.

Discussing experience in Europe, Mr. Margot finds that the locomotive runners accommodate themselves readily to the Hall enclosed disks. There has been no trouble as yet from the accumulation of snow or frost on the glass windows of the signal cases. Answering criticisms which were made at the 1900 Congress, he says that wooden fish-plates have done well on the Midi, and that "the track circuit is no obstacle to the construction of very solid track." The Hall signals on the P.-L.-M. were installed in 1898, but not for two years did they trust them. Finally, in August, 1900, the old manual signals were put out of service, and the automatics allowed to serve. For the first 16 months there were 365 non-dangerous failures and 17 dangerous; but the similar and

more perfect installation on the Midi showed, for eight months, 129 failures, equal to 63 per 100,000 operations, none of which were dangerous.

The automatic signals on the Austrian Southern were made by an electric company of Budapest, and the same road is going to try another system invented in Vienna. On the Paris Metropolitan there are automatic signals worked by track instruments, without a track circuit. The Dutch State Railroads have 249 miles of line equipped with non-automatic signals; there are 128 cabins, of which all but four are attended by station men, gate keepers, etc., who would have to be employed anyway.

The arguments concerning the relative merits of automatic and non-automatic block signals are set forth at considerable length. An officer of the P.-L.-M. in a statement favoring manual signaling, says that at 36 signal stations, where the number of trains per day is 80, the signalmen in one year (1901) stopped 97 trains on account of defects or difficulties in the cars, or their appurtenances, things which, of course, the automatics could not do. All of the different roads replying to the reporter's circular emphasized this feature—the desirability of having watchmen on duty to perform other duties than block signaling. Most of the roads give as a principal reason for not adopting an automatic system, the fact that they have men stationed at frequent intervals along the line who can manage the manual signals without much additional expense.

The Kaiser Ferdinand-Northern Railroad has 172 miles of line equipped with the manual block system; the Hungarian State Railroad, 262 miles; the Belgian State Railroad, 1,015 miles, and the Orleans of France has 932 miles.

The South-Eastern & Chatham, of England, expresses a favorable opinion of automatic block signals, but has not adopted them. The Lancashire & Yorkshire, of England, and the Cape Government Railroads of South Africa are going to try the "American block system."

Mr. Margot concludes that lines already equipped with non-automatic signals will find no advantage in changing to automatics, except in special cases, as, for example, where an intermediate section is required in a long tunnel, or elsewhere. But on lines not yet fitted with a block system it may be advantageous to adopt the automatic. The automatic is without doubt best suited to metropolitan lines and under certain conditions "to lines on which it is desired to increase safety without excessively increasing the working expenses."

His two principal final conclusions are:

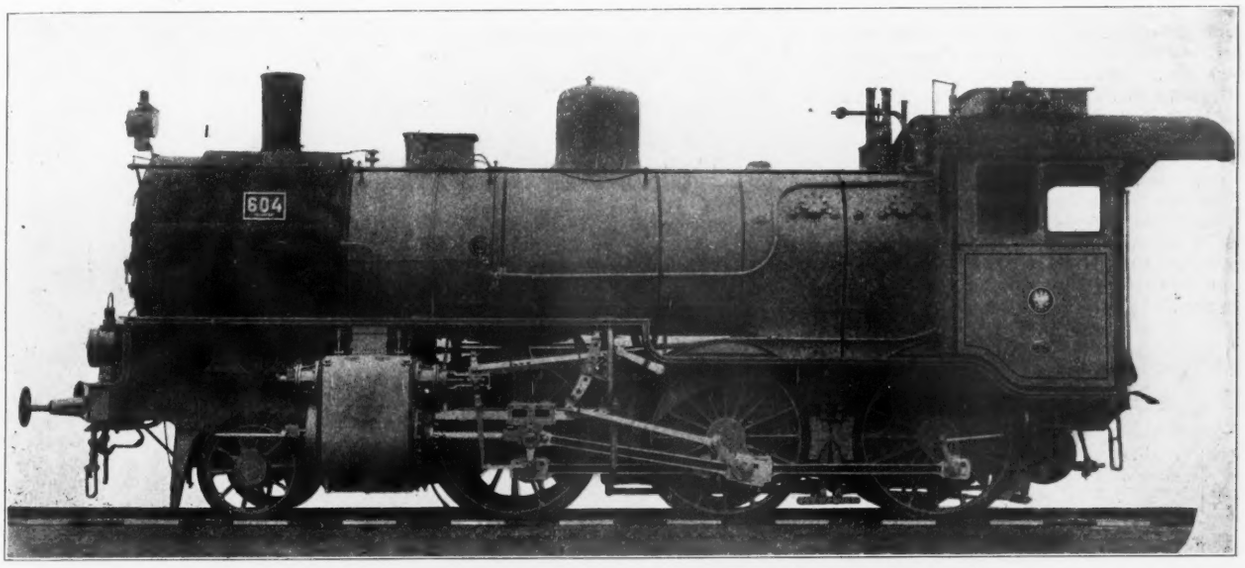
1. The automatic block system, using a track circuit which substitutes the intervention of the train for human agency, satisfies most completely the conditions of working, from the technical point of view.

2. The automatic block has not yet attained any development outside the United States of America. Nevertheless, some applications made on main lines are, at present time, beyond the experimental stage. It has been observed, more particularly, that the track circuit is compatible with high speeds, without entailing appreciable difficulty in the maintenance of the track.

## Superheated Steam Locomotive for the Royal Prussian State Railways.

The engine shown herewith was built by the Berlin Machine Building Company (Berliner Maschinenbau-Actien-Gesellschaft Vormals L. Schwartzkopff) from the designs of Gen. Baurat Garbe, and is intended for hauling fast goods trains, passenger and express trains on heavy lines. The following are the principal dimensions:

| | |
|---|---|
| Total weight, lbs. | 125,400 |
| Weight on drivers, lbs. | 97,020 |
| Cylinders, in. | 21.3x24.8 |
| Diameter of drivers, in. | 63 |
| Heating surface, fire-box, sq. ft. | 124 |
| Heating surface, tubes, sq. ft. | 1,264 |
| No. of tubes. | 220 |
| Grate area, sq. ft. | 23.7 |




Mogul (2-6-0) Locomotive with Superheater for Prussian State Railroads.

The engine is the 2-6-0 type. The cylinders are simple and the valve motion is of the Heusinger type with piston valves 5.9 in. in diameter. In the smoke-box is a Schmidt superheater, in which live steam is superheated, before entering the cylinders, up to 570 to 660 degrees Fahrenheit. The superheater consists of bunches of pipes, bent to the shape of the smoke-box shell and ending into two steam chambers in top of the smoke-box. The superheater is heated by gases of high temperature (1,470 to 1,830 degrees Fahrenheit) coming directly from the grate through a flame tube of 12 in. diameter. This superheater has given excellent results on all the locomotives to which it has been fitted, and upon the lines of the Prussian State Railways, the use of these superheated locomotives is increasing very rapidly. During recent months a series of important and exhaustive trials have been made with the locomotive illustrated herewith, in order to ascertain its relative efficiency, in respect to speed and economy, in the operation of goods as well as in the heavy mountain express services. The superheated steam mogul locomotive has proved itself superior to an ordinary mogul locomotive of the same weight and also to a four-cylinder compound ten-wheel engine of 15 tons heavier weight, the average saving in water amounting to 18 to 20 per cent.; in coal 12 to 15 per cent., while the cost of maintenance and repairs were less. The superheated engine hauled on a line 124 kilometers (77 miles) long, with many curves and with grades of 1 in 100, an express train of 42 axles, 322 tons, and a total weight of engine and tender of 424 tons at an average speed of 80 kilometers (50 miles) per hour, the maximum speed reached being 105 kilometers (65.3 miles). The average cut-off in the cylinders on this trial was 23 per cent. With the heaviest of loads, the starting is effected without any difficulty, which in a great measure demonstrates the advantages of superheated steam, which also, with cold cylinders, only gives a small loss of condensation. All parts coming in contact with the highly-superheated steam—such as pistons, piston valves and stuffing boxes—have worked satisfactorily while there has been found no difficulty whatever with the superheater. The average temperature of the steam was 626 degrees Fahrenheit, and the steam pressure has been throttled down to 135 lbs. in the steam chest, so that there was an abundance of steam in the boiler during the trials. The engine is fitted with pneumatic sanding apparatus on the Bruggeman system, and with a speed indicator of the Haushalter type. The pistons and piston valves are lubricated automatically by means of oil presses.

## Unjust Sugar Rates to Wichita.

The Interstate Commerce Commission has decided in the case of the Lehman-Higginson Grocer Company and other wholesale grocers in Wichita, Kan., against the Atchison, Topeka & Santa Fe and other carriers. The complainants alleged that the carriers, having in effect on sugar in carloads from New Orleans rates per 100 lbs. which were 25 to Wichita and 20 cents to Kansas City and other Missouri river points, increased those rates to 47 cents to Wichita and 32 cents to Missouri river points, thereby increasing the differential as between Wichita

and Kansas City from 5 cents to 15 cents, and that the new rates were, as against Wichita, unjust and unreasonable in themselves and relatively. The complainants further alleged that new advanced rates from other points. Wichita and Kansas City compete for the sale of sugar in common territory. The competitive conditions applying in the transportation of sugar to Wichita and Kansas City are found not to justify the 15 cent differential against Wichita, and the existing rates to Wichita are excessive. The Commission holds that the rate of 47 cents on sugar from New Orleans to Wichita is unreasonable; and that the present differential of 15 cents applied at Wichita above Kansas City on shipments of sugar from the Atlantic seaboard and New Orleans subjects Wichita to unjust discrimination, and that such differential should not be more than 8 cents.

## Railroad Shop Tools.

*(Continued.)*

### SLOTTING MACHINES.

The accompanying illustration, Fig. 1, shows the 24-in. slotter made by the Niles works of the Niles-Bement-Pond Company, New York. This tool is designed for heavy forge work and is of the geared type. The ram is driven by rock and pinion with tangent gearings at the side, as shown. The ram guide is adjustable by means of screws at the sides. The distance from the face of the ram to the column is 37 in. and the height of the ram guide is 31 in. The tool clamps are arranged so that they can be removed, thus leaving the face of the ram free for the relief tool-holder at the bottom of the ram. The circular table is 50 in. in diameter and has four corner clamps. It has a longitudinal adjustment of 40 in., a transverse adjustment of 36 in., and it is graduated. The feed is actuated by steel tappets on the ram. These are in the correct position when adjusted for the length of stroke. The feed operates at the top of the stroke, thus obviating the dragging of the tool over newly cut surfaces. The belts are shifted by means of a patent shifter, shown on the side of the machine, and all operating cranks are placed within easy reach of the operator.

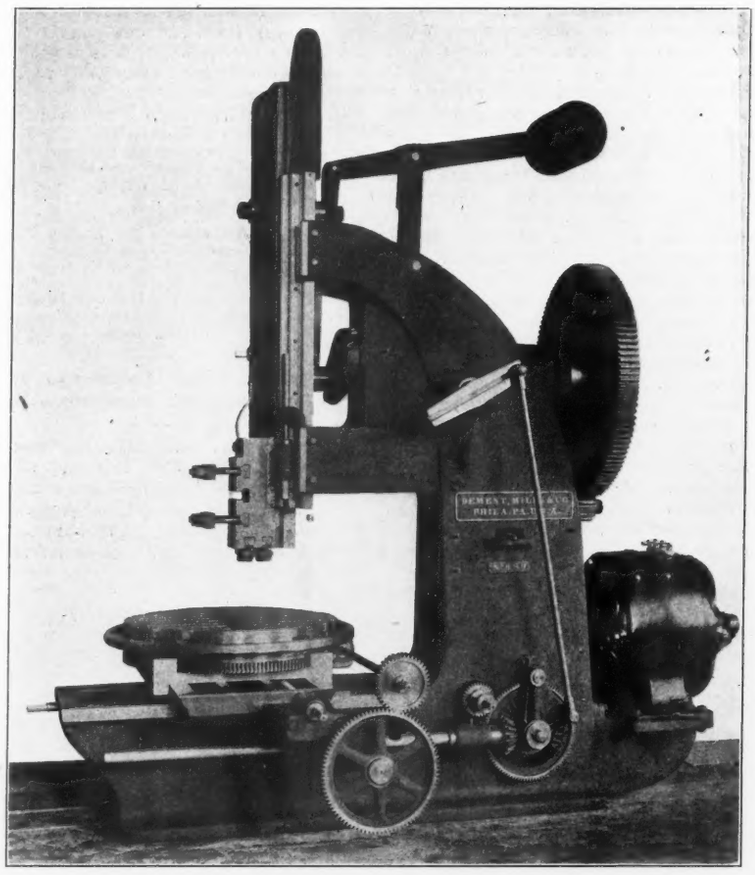


Fig. 2—The Niles-Bement-Pond 18-in. Crank Slotter.

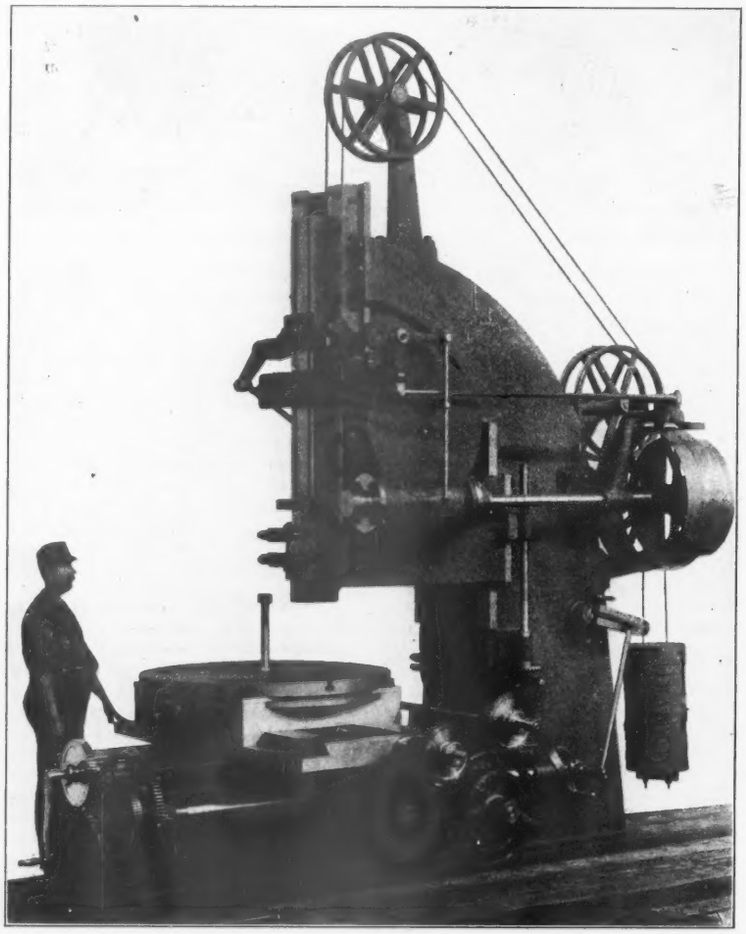


Fig. 1—The Niles-Bement-Pond 24-in. Geared Slotter.

Fig. 2 shows an 18 in. crank slotter made by the Bement, Miles works of the Niles-Bement-Pond Company, New York. The maximum stroke of this tool is 18½ in., the height between the table and frame is 21 in., and the distance from the front of the tool apron to the column is 34 in. The working surface of the table is 36 in. in diameter, and it has a longitudinal traverse of 41 in. and cross traverse of 36 in. The cutter bar has a spring relief tool apron with both vertical and horizontal clamping surfaces. When bolt driven, countershaft pulleys 22 in. in diameter by 5½ in. face are furnished, and these should run at 110 and 170 r.p.m. The machine shown is driven by a 7½ h.p. motor having a speed range from 700 to 1,400 r.p.m. The motor is mounted on a bracket at the rear of the frame and is connected with two sets of gearing within the frame. Between the two sets of gearing there is a clutch, which is operated by a lever extending to the operating side of the machine, as shown. With the motor speed range and the two runs of gears, cutter bar strokes from 6½ to 29 per min. are obtained.

Fig. 3 shows a 15-in. traveling head slotter made by the T. C. Dill Machine Company, Philadelphia, Pa. Owing to the adjustable head, a wider range of work can be done on this machine than can be done on the ordinary design of slotter. An intermittent feed

is provided for operating the head, and feeds the tool to such work which is too cumbersome to be fed to the tool. The head is also arranged so that it can be clamped rigidly in any position, and on work not needing an extended reach, the cutting bar can be brought back close to the column, thus making the machine very rigid. When the cutting car is close to the column and the table is brought forward to its limit, the outside of work of large diameters can be machined. A quick traverse gear is provided for moving the head and compound table in all directions by power; the value of this as a time and labor saver is of importance in setting work to a line, or to a surface already machined. A pointer or tool can be placed in the tool post and the machine proper can be thrown out of gear, leaving the cutting bar stationary. The quick traverse gear can then be thrown in and the work can be set by moving the work or the tool forward and backward by power. This feature is also of use in setting the tool in position for another cut; thus, when one cut is finished, power is applied in bringing the tool to its first position, ready to start the new cut. This can be done while the machine is in motion or at rest, as desired. The quick return in this machine is accomplished by the main driving gear moving in a path eccentric to the crank shaft and connected thereto by means of a link. The quick movement begins just before the tool gets to the bottom of the stroke. This assures a constant cutting speed and moves under the bottom center at a high speed, making an accelerated up stroke; the quick part of the stroke, however, is at a point when there is but slight movement to the cutting bar. This affords a saving in power and in wear and tear on the machine. There is a safety device provided for the quick traverse gear and intermittent feed. This is arranged so that should the head or table receive undue strain, it would be thrown out of gear, and thus prevent the machine from being injured. A stroke indicator is provided which indicates the amount of stroke the machine is set to, and a hand wheel controller is also provided for arresting the motion of the machine after the power has been thrown off. The tool post is fitted in a relief apron which facilitates the changing of tools, and the table, which is 34 in. in diameter, is graduated in degrees, so that it can be readily set to any desired angle. The cutter bar has a wide range of adjustment, and in many instances work can be done which requires double the rated stroke of the machine. Six changes of speed are obtainable by means of the three step cone pulley and the back gears. When the machine is fitted with a constant speed motor the speed changes are obtained by means of a speed box. The principal dimensions of this machine are as follows: Length of stroke, 15½ in.; longitudinal movement of table, 36 in.; transverse movement of table, 30 in.; movement of head, 21 in.; distance from the table to the ram when in highest position, 24 in.; distance from the table to the ram when in lowest position, 1½ in. This machine will cut to the center of a 72-in. circle and will cut to the outside of a 90-in. circle; and its net weight is between five and six tons. A machine of this type is in use in the Renovo shops of the Pennsylvania Railroad, where it is giving satisfaction.

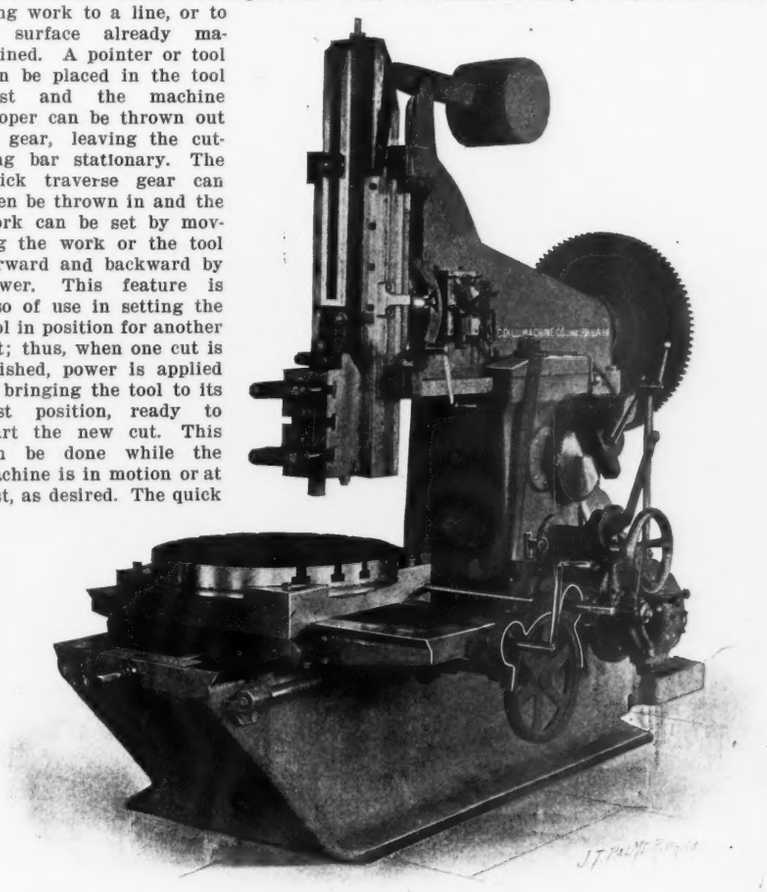


Fig. 3.—Dill Traveling Head Slotter.

*(To be continued.)*

The baggage-smasher has been thought to be an exclusively American species; but he seems to have relatives in Prussia, of all countries in the world, and has led the Minister of Public Works to interfere with his activity by a circular in which he says that he sometimes smashes so effectively that the railroad management is called upon to pay damages. The smashing, he says, is attributable to lack of skill as often as to carelessness and negligence; hence the men must be instructed how to perform their duties, and emphasis must be placed on the regulation, long standing, that pieces of baggage must be lifted, carried, or wheeled, and never slid or thrown.

## Charles Minot's Rules.

BY G. F. R.

The train rules of the New York & Erie Railroad, issued on March 6th, 1854, may perhaps be of interest to the younger generation of the readers of the *Railroad Gazette*. They will be struck by the similarity between them and what many of us have come to regard as the outgrowth of the superior wisdom of our own time. For example:

Rule 1: "Each person in the employ of the Company is to devote himself exclusively to its service, attending during the prescribed hours of the day or night, and residing wherever he may be required."

Rule 4: "Unless appointed so to do, he is not on any occasion, or under any pretence whatever, to receive money from any person on the Company's account."

Rule 5: "No one, whatever may be his rank, will be allowed to absent himself from his duty, without the permission of the head of the Department in which he may be employed."

Similar rules, in substantially the same words, will be found on many roads to-day. Next follows a rule regarding deportment of employees and their treatment of the company's patrons. After this comes the well-known rule, still in use, directing employees when in doubt to take the safe course; another enjoining care in the use of the company's property, etc., all of which have a very familiar sound.

On signals, the rules prescribe the same use of red and green, and torpedoes, that is so familiar to-day. This is also true of the whistle signals, even to four blasts to call in the flagman; five blasts, however, was the signal for "wooding up" in those days; and red flags and lights were carried on the front of the engine instead of green, to denote a following section. [This practice may be found to-day.—EDITOR].

Many of the rules will co ıpare favorably with the modern rules of the American Railway Association. There is one prescribing the manner in which detached portions of a train must be handled in case of breaking in two; another depriving a train of all rights when twenty-four hours or more behind time; another prescribing the method of moving a train which has been held by another between telegraph stations; another explaining that full-face figures on time tables indicate meeting or passing points.

Section 4 relates to the duties of conductors. One of these rules sounds a little peculiar at this date:

"When there are any horses on a train, unless the owner has sent a person in charge of them, he will see that they are carefully watered and moderately fed on the road, and such expense shall be paid him by the Agent at the end of his stage."

A rule to-day requiring the conductor to furnish any part of the capital necessary to the conduct of the business of a railroad would probably precipitate a visit from the Grievance Committee.

The fifth section relates to the duties of enginemen. Care is enjoined in starting and in stopping; or, as it is termed in the somewhat quaint language of the time, "bringing up the train." There is one rule, however, which we may well suppose was not in all cases strictly adhered to. It reads:

"The trainmen are required to stop the train when occasion requires without allowing it to press upon the tender; and the engineer is required to stop the engine and tender without allowing them to draw upon the train."

Certainly a very nice operation, and an ideal manner of handling a train.

The sixth and seventh sections relate to

the duties of station agents, baggagemen, and miscellaneous employees. Only eighty pounds of baggage was carried free in those days. A corpse was transported for two first-class fares.

The ninth section contains a rule which, while still with us in spirit, has been shorn of the breezy and refreshing language of 1854. It reads:

"Employees of the Company disapproving of these or other regulations of the road, or not disposed to aid in carrying them out, are requested not to remain in the employ of the Company."

The remainder of the book consists of instructions relating to passes, list of officers of the road, table of distances, and a speed table. The whole is issued under the authority of Charles Minot, Superintendent.

The book contains several references to double track, and it is plain that the telegraph was used in connection with train movement, and also for the transmission of standard time daily at noon, precisely as at present, and yet there is one rule which indicates that so simple a thing as a ticket punch had not yet been brought into use. This is a rule relating to the handling of passes by conductors, and required a corner to be torn off to show that the pass had been used—each division of the road being indicated by a certain corner of the pass, prescribed in the rule.

No doubt many readers of the *Railroad Gazette* are familiar with the name of Charles Minot, and know the valuable service he rendered to railroads as a pioneer in the profession. He is credited with being the first to make use of the telegraph to control the movements of trains, and it may be worth while to repeat the somewhat familiar story:

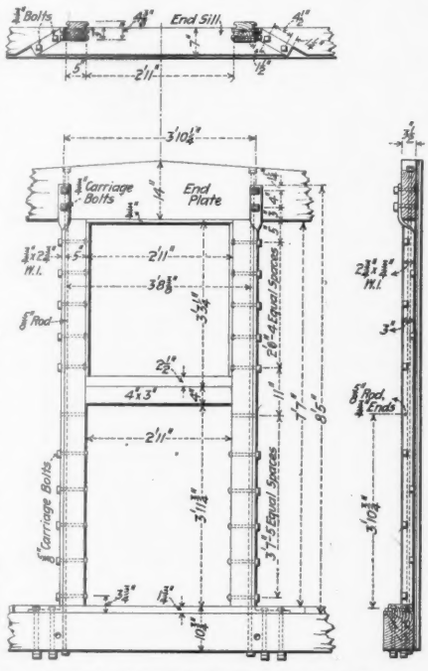
"In 1850 the Erie Road was in operation between Piermont and Elmira. The track was a single one, such a thing as a double track being then unknown in the country. Two years before, after much discussion and opposition, a telegraph wire had been put up along the line. Superintendent Minot, who was a man a long way in advance of the times, was a strong believer in the practicability of the telegraph as a facilitator of transportation on railroads. In the summer of 1850 he was a passenger one day on a westbound train over his road. The train he was on, according to the printed time-table, was to meet a through train from the west at Turner's Station, 47 miles from New York. When Mr. Minot's train reached Turner's, he learned that the eastbound train was six hours late, owing to some mishap. Under the system of railroading then governing employees, the westbound train had to remain at Turner's until the delayed train passed that station. In fact, the whole business of the road from there west was at a standstill owing to the non-arrival of the train at the different stations where other trains were awaiting it. Superintendent Minot saw at once how ridiculous such a system was. There was a telegraph office at Turner's, and it was then the only one between that station and Jersey City. The Superintendent went to the office and made the operator's hair stand by sending a message to the station agent at Port Jervis that he intended to run the train he was on from Turner's to Port Jervis on the time of the belated eastbound train. He ordered the agent not to let any train leave that station going east until the train he was on arrived there. He also ordered the agent to telegraph to him how he understood the message. The answer was satisfactory, and the Superintendent went to the conductor of the train and told him to start on with his train. The conductor refused to do so, and the Superintendent discharged him on the spot. Minot then ordered the engineer to pull out. The engineer said he would not take the risk, and in the argument that followed, the Superintendent dragged the engineer from the cab, gave him an elegant dressing-out, and mounted the footboard himself. He ran the train to Port Jervis, and sent it on west as far as Narrowsburg before it met the late train, thus saving the passengers five hours, and settling forever the question of the accuracy of the telegraph in running railroad trains."

While this is being written, a friend to whom the above was shown, together with the old book of rules, confirms the story of the first train order, and tells me that his father was the telegraph operator upon whose hair Mr. Minot's telegram is said to have had such a very peculiar effect; but he calls attention to the need of allowing a grain or two of salt in reading about the alleged harsh treatment of the objecting conductor and engineer.

In the statement quoted it is said that such a thing as double track was unknown in 1850; but the book of instructions, published four years later, prescribes rules for the movement of trains over double track, showing that progress had been made in that time.

## End Post Reinforcement for Box Cars.

The Chicago & Alton is building a number of 36-ft. box cars at its Bloomington shops which will have the end-posts reinforced in the manner shown in the accompanying drawing. The end posts which are 4⅜ in. x 5 in., are framed into the sill and plate in the usual way. On the outside edge of each post a wrought-iron strap, 2¾ in. x ¾ in., is bolted on with ten ⅝-in. carriage bolts. The bottom of this strap is bent out and




Detail of End Post Reinforcement.

bolted to the top face of the end sill with ¾ in. bolts, and the top end is twisted a half turn and bolted to the outside face of the end plate. A 4-in. x 3-in. filling piece and a ⅝-in. tie rod fasten the two posts together about half way from the floor, and ⅝-in. vertical tie rods extending through the sill and plate are laid in grooves cut in the outside faces of the posts.

## Washington Railway Appliance Exhibition.

Applications for membership and for exhibit spaces in the American Railway Appliance Exhibition, to be held in Washington, D. C., May 3 to 14, in connection with the International Railway Congress, are now invited, and assignments of space will be in the order of receiving checks. Exhibitors proposing to erect their own booths, pavilions or exhibit structures will have access to the grounds. The building to be erected by the committee is expected to be ready for exhibits by April 15. As the time is very short it is earnestly requested that all interested give this matter immediate attention.

Following are the rules for the government of members and exhibitors:

1. All manufacturers of and dealers in American railway appliances, material and supplies, are entitled to membership in the exhibition, upon the payment of a membership fee of $50. Only members are entitled to occupy space as exhibitors, but membership is not confined to those who propose to make exhibits.

2. Members are entitled to attend and participate in all ceremonies, functions and entertainments that may be arranged by the committee; to have their names printed in an official pamphlet, stating the nature of their business and where located.

3. The committee will erect a large building for the housing of the smaller and lighter exhibits, similar to those displayed on the verandas during the mechanical conventions held annually in June. Spaces therein will be 10 ft. in depth and 5 ft. in width, or the multiples thereof. A charge of 50 cents per sq. ft. will be made for space occupied in this building.

4. Exhibits to be operated by power, excessive in weight or requiring large space, will necessarily have to be installed outside of the exhibition building erected by the committee, and the booths, pavilions, or other structures in connection therewith will be erected by the exhibitors at their own expense. A charge of 10 cents per sq. ft. will be made for ground so occupied.

5. A temporary track will be laid on B street, fronting the exhibition grounds, for the display of cars. The charge to be made per car will be announced at an early day.

6. No excavations for foundations can be made, but all exhibit structures must rest upon foundations that may be laid upon the surface of the ground.

7. Before any application for exhibit space shall be considered application for membership must be made accompanied by check for $50, the membership fee, and by check for the amount of space desired. All checks to be drawn to the order of Chas. A. Moore, Treasurer.

8. The committee shall not be held liable for any loss or damage by fire, flood or other casualty, or by theft. The committee will arrange for such safeguarding of the exhibits as will prove adequate during the continuance of the exhibition. As the exhibition is not an incorporated body, and the service of the committee and its officials is purely a voluntary and gratuitous one in the interest of our great industry, its members, of course, will not be expected to assume any personal liabilities in connection therewith.

9. All structures erected must be approved by the officer in charge of public buildings and grounds before erection can be begun; hence exhibitors proposing to erect their own exhibit structures must submit plans at the earliest possible date to the Director of Exhibits for such approval. As a general suggestion in regard thereto, such booths or exhibit structures should be of tasteful design, about 12 ft. in height from the platform at the eaves, if covered, and of sufficient slope from the ridge pole to permit of proper drainage.

10. The Director of Exhibits shall approve of the size, design and location of all advertising signs.

11. Exhibitors erecting their own structures must remove such structures and exhibits from the grounds prior to May 25, 1905, as that is the date fixed by the Act of Congress when the right to use said grounds for exhibition purposes will expire.

12. Steam and electric power will be placed at a central point, exhibitors to make their own connections and pay for the power used.

# GENERAL NEWS SECTION

## NOTES.

On the Cleveland, Cincinnati, Chicago & St. Louis the number of miles of line worked by the block system (incorrectly given in our table of last week) is 982 miles; single track 788, double track 194.

The Union Pacific will soon put up automatic block signals on its single track line between Buford, Wyo., and Hermosa Junction, 13 miles. The Oregon Railroad & Navigation Company is to put up automatic block signals on its line between Portland and Bonneville; between La Grande and Cayuse, and in a number of other places.

The Canadian Pacific has made advances of from $2 to $10 a month in the pay of many of its despatchers and operators. Train despatchers are to have three weeks vacation each year, and other telegraphers who have served four years or more will have two weeks.

The Civil Service Commission of the United States, Washington, D. C., has advertised for yardmasters, trainmen and enginemen to go to Panama, and will receive applications to be considered at an examination to be held February 13. Yard masters must be between 25 and 50 years of age and men for the other positions between 21 and 45. Only experienced men are wanted. Yard masters will be paid $130 a month, switchmen (yard trainmen) $100 a month, switchmen's helpers $75, train conductors $100, trainmen $75, and enginemen of switching engines $83.33, $100 and $115.

The Long Island has increased the commutation rates to various places on its road about 20 per cent. Officers of the road say that these rates are increased for the purpose of getting increased revenue to meet present expenses and that transportation has been sold to passengers at less than cost. A New York paper compares the rates on the Long Island with other roads to points 15 miles from the terminus, which shows an increase of about 50 per cent. in these rates. To Rosedale, a distance of 14.7 miles, the commutation rate is $9.33, which is largely in excess of the amount charged by other roads for a similar distance.

Persons who are intending to take their vacation in the shape of a trolley ride, by moonlight or otherwise, from New York to Boston or from Boston to New York, will do well to postpone the trip until spring, as that much heralded pleasure-route has come to grief. The Hampshire & Worcester, the line connecting Ware, Mass., and West Brookfield, has been closed by the Superior Court, on petition of the Receiver who is in charge of the road. This makes a break of about eight miles; or, if one were to take the shortest steam railroad connection between the separate electric lines, a break of 13 miles (between Palmer and West Brookfield). Picnics and outdoor vaudevilles are not popular in Massachusetts at this season, and the running expenses of the road have lately been so much greater than the receipts that a question arose as to whether the deficit might not be so large as to eat up all next summer's profits.

The Cleveland Electric Railway Co., which operates every street car line in the city of Cleveland, Ohio, last week made a test of three-cent fares within a limited zone. The zone district extends about two miles in all directions from the business center. The cars running to the suburbs, on which five-cent fare is charged, were jammed as usual during the early morning hours, while those running within the three-cent zone carried comparatively few passengers. Owing to the large number of additional cars put on the various lines frequent delays occurred. No transfers are given on three-cent fare cars. The result of the first day's experience showed that the percentage of passengers benefited by the 3 cent fares was quite small. One explanation of the comparatively small number of passengers using the 3 cent cars was that rather than wait for the alternate reduced fare cars they would board the 5 cent cars, regardless of their destination.

The following is a verbatim copy of a letter received by the Michigan Commissioner a short time ago: "Railroad Comishner, Lancing, Mich. Kind sir:—Plees excuse my writing to you, but i do not feel I have ben treeted rite by the pere marquette railroad kumpany. i ordered 5 big cars for to lode stears Dec. 2nd. and was promist them shure by thare Agent. He said he would have them shure for me and i kut out a bunch of stears to lode 5 cars and when i got the stashun i found a lot of damd old short line cars ful of dirt froze in chunks. i tried to git the agent to hav the dirt taken out anyway but he only laffed at me and gide me, he sed he felt fur me but was to strong to fork dirt, but wood lend me a shovel and help me grunt, now Mister Comishner i want to no if that is the kind of treetment i am to git all the time. i and my men had to shovel the dirt out of those six smawl cars then lode them with only some ha in the bottom and the agent kiked becaus i put the ha in the cars he got reel gay and told me i ha beter not git extravigent as i mite want the ha to chew myself. i beg to submit the folowing clame aganst the railroad 920 pds ha at $9., tun $4.50 one axtra car i did not need if i had been given the five of the kind of cars prosist $121. total $125. plese let me here from you soon."

A snow storm, accompanied by high wind, which prevailed in southern New England, eastern New York and Pennsylvania, and also farther south, on January 25, was generally regarded as the most serious interruption to traffic in those regions since March, 1888. The snowfall amounted to only about eight or 10 inches, but the fall, and the high wind and low temperature accompanying it were continuous for from 12 to 24 hours. Trains between New York and Boston were delayed twelve hours or more. Express trains from New York to Albany starting Wednesday afternoon were stuck in the region of Poughkeepsie all night, and southbound express trains suffered the same fate, though the derailment of an engine of the Empire State express, southbound, appears to have been a principal element in causing the delay. The Pennsylvania had trains blocked in the cuts near Jersey City for many hours, and the other New Jersey roads terminating on the Hudson river appear to have been in the same condition. Trains were blocked many hours as far south as Wilmington and Baltimore, some of them all night; and near Frederick, Md., a passenger train of the Pennsylvania was stuck in drifts all night. On the Pennsylvania between Philadelphia and Harrisburg traffic was at a standstill for 12 hours or more. The newspapers reported that in a train of the Lackawanna stalled near Washington, N. J., passengers suffered from the cold by reason of the failure of the steam in the passenger cars, the passengers finally forcing their way into the baggage car. In a passenger train of the New York Central, stalled near Poughkeepsie, the passengers say that they had to sit in darkness from 4 a.m. until daylight on account of the failure of the gas. On Long Island the snow was deeper than elsewhere, and some sections of the Long Island Railroad were blocked for 24 hours.

### American Locomotives for Russia.

The East St. Louis Locomotive & Machine Shop Company has received from E. Tillmanns & Co., of St. Petersburg, Russia, an inquiry for 100 light locomotives, to be delivered within three months. The inquiry was dated January 11, eleven days before the present insurrection broke out. The locomotives are supposed to be for use on the government line across Siberia. The Tillmanns Company is a large wholesale locomotive concern, with branch offices at Odessa, Baku, Charbin and Vladivostok.

George W. Allen, Vice-President and Treasurer of the East St. Louis Locomotive Works, stated yesterday that the company would be unable to fill the order within the required time. The locomotives desired are of the following type, according to the Tillmanns letter:

"Light locomotives for 30 in. gage of track and best coal-firing, with separate tanks and three axles. Load of empty locomotives 8½ tons, of loaded locomotives 9½ tons, diameter of wheels 600 mm., pressure of axle 3½ to 3¾ tons for loaded locomotives. Eventually also locomotives of four axles would be accepted, and in such case the pressure of axle would be distributed accordingly."—*St. Louis Globe-Democrat.*

### Railroad Mail Service.

The following resolution passed the Senate on Jan. 25.

*Resolved*, That the Postmaster-General be, and he is hereby, directed to inform the Senate:

First. The amount paid each year to the railroad companies for the purpose of carrying the United States mail since 1873.

Second. The total number of pounds of mail carried each year by the railroad companies since 1873.

Third. The pay per mile per annum per hundred pounds for carrying the mail each year since 1873.

Fourth. How often the mails are weighed to ascertain the average weight of the mails carried, and how the Post-Office Department obtains the average weight.

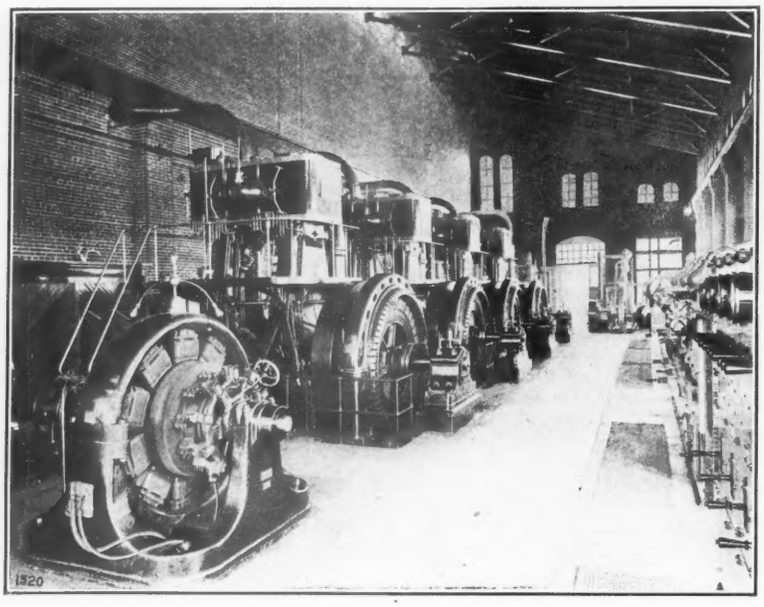
The Postmaster-General is specially directed to inform the Senate if, under the present law, the average weight of mail can be ascertained without the knowledge of the railroad companies carrying the same, and without giving such companies an opportunity to increase the weight of the mails when such average weight is being ascertained by the Post-Office Department.

Fifth. How long the present prices to railroad companies for carrying the mail have been paid, and what reductions have been made since 1873; if any have been made, to specify in each instance what the reduction has been.

Sixth. To furnish to the Senate all the facts going to show how long the present prices for carrying the mails have been continued, and to give the Senate, if he has such information in his possession, any fact that will go to show that a reduction in present prices can be made.

### The Air Compressor Plant at the St. Louis Terminal Station.

The air compressing plant proper is located in the main power house of the Terminal Station on Eighteenth street, south of the train sheds. It consists of two duplex steam-driven two stage air compressors built by the Ingersoll-Sergeant Drill Co., of New York, and of the type known by the makers as Class "GC." These compressors take steam from the central boiler plant at 150 lbs. pressure and run non-condensing. The duplex steam cylinders are each 18 in. in diameter; low pressure air cylinder is 32¼ in., high pressure air cylinder 20¼ in. in diameter; the common stroke is 24 in. Both high and low pressure air cylinders are equipped with the piston inlet valve. The power of each compressor unit is about 350 h.p. and at the rated normal speed of 100 r.p.m. the free air displacement of each machine is 2,180 cu. ft. per minute delivered at a pressure of 85 lbs. The air intake conduit leads cold air from the outside to the machines, and this, with the large vertical receiver intercooler between stages, and the jacketed air cylinders assures economy of compression. The air discharge pipe from the high pressure cylinder is 6 in. in diameter and leads to the receiver outside the engine room. Each unit has its own receiver, of vertical type, 36 in. in diameter and 16 ft. long. These are mounted side by side in the cooling house or tower to the south of the main engine room. In this same building is also the air cooling and drying system. A pipe from each of the primary receivers leads to a secondary receiver 30 in. in diameter by 3 ft. long, from which it discharges into a lower 4-in. horizontal header. Branching from this header is a great number of ¾ in. pipes leading vertically to another 4-in. header near the roof of the cooling tower. This second header is a little more than twice as long as the first and from the other end of it an equal number of ¾ in. pipes branch downward to a third header of the same size as, and in line with, the first header. In effect this arrangement is that of a large number of U-tubes through which the air circulates, with the maximum air cooling effect. From the third header the air enters another secondary receiver of the same size as the first secondary and emerges thence to the lines. Drip cocks are inserted in the lower headers and in the secondary and primary receivers. All moisture is condensed in this system and removed through the drain cocks and only in the most severe weather has it been found necessary to inject alcohol into the air pipes of the switch and signal system to prevent freezing. While the cooling system is in duplicate, that is, made up of two primary and secondary receivers and cooling devices as described, yet the piping arrangements are such that the two can be connected in parallel or the discharge from both compressors may be delivered through either one of the two branches. The large openings in the walls of the cooling tower are closed by adjustable shutters by which the circulation of outside air through the room can be regulated.

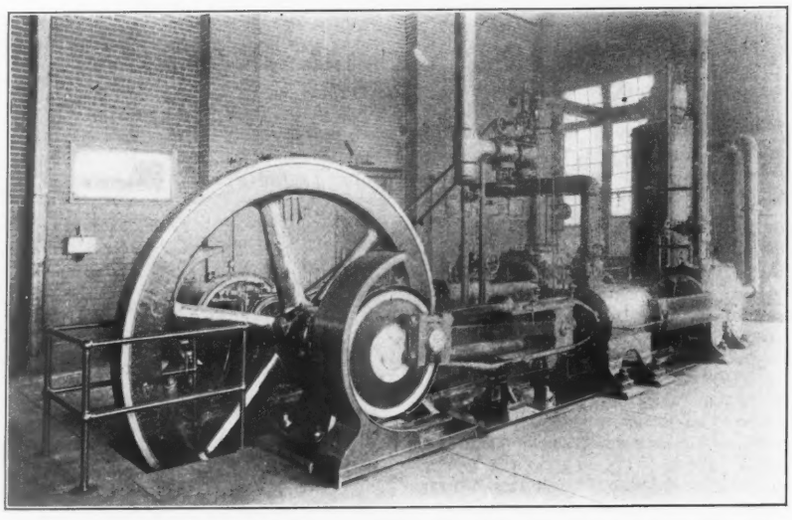


Engine Room of Power House of St. Louis Railway Terminal.

The uses of the air from this central system are many and varied. The general scheme of distribution is as follows: From the center of distribution—the cooling tower—five main branch lines radiate; a 3-in. pipe main about 5,000 ft. long leads to the Grand avenue yards, where the air is applied in an interlocking switch and signal system. The power is also used in the Grand avenue shops in driving two 4-in. x 5-in. standard Westinghouse engine generators, furnishing current for the signal system at from 22 to 31 volts; several small engines for other purposes are also run from this line. Another 3-in. branch leads to the Atlantic street yards, a distance of about 3,000 ft., where the air is applied in cleaning cars, charging the brake reservoirs, and in the operation of car jacks. A third branch of 3-in. pipe 2,500 ft. long leads to the Poplar street yard, where the air is applied in another system of interlocking switches and signals. A fourth branch is a 4-in. pipe leading to the train sheds of the main terminal, a distance of 1,800 ft. Here the air power is applied in charging the brake reservoirs, in lifting jacks and in cleaning cars; while a branch pipe leads to the main head-house or station building, where the air is used in the pneumatic despatch tube system communicating between the telegraph office, baggage rooms, information bureau, express office and the other departments of the terminal. In the offices of the station the air is applied in the letter presses, which are equipped with small pneumatic cylinders in place of the ordinary screws. The fifth branch of the air distribution system is a 3-in. line supplying the main switch and signal system of the terminal station and head-end yards.

In the Fourteenth street engine house air from one branch of the system is used to blow the fires of the locomotives and to operate forges, hoists, pneumatic tools and the various other pneumatic appliances of the railroad repair shop.

The pipe distribution systems for air, steam and water are carefully worked out along lines of greatest effectiveness and economy. These three lines of piping are laid side by side in boxes; they are easily accessible and open to inspection, yet are protected against the elements and accidental injury. The greatest care is exercised to avoid all leakage losses and the pipe system is maintained at the highest efficiency.



Ingersoll-Sergeant Class "G. C." Compressor in the Power House of the St. Louis Railway Terminal.

In all the yards—Sixteenth street, Twenty-first street, Express, Head-end and Atlantic street—and wherever the air power is likely to be found useful, ¾-in. hose connections are inserted at intervals in the pipe lines by which air can be applied for any purpose desired. Among some of the other minor applications of air may be mentioned the Shone ejectors, three in number, which are installed in the terminal subway to dis-

charge any seepage water which may collect. These appliances, having a capacity of 250 gallons per minute each, are installed in a sump about midway of the main subway and are automatic in action; that is, when the cylinders fill with water, the automatic valve opens to admit air to eject the water and closes when the cylinders are empty; the pumps are then ready for another charge. In the accumulator pit of the main hydraulic elevator system, small duplex bilge pumps, air driven and automatic, handle any water which may escape into the pit. Throughout the yards the air is used in blowing the yard signals; and in the main power house it is found extremely useful in cleaning the machinery.

The most important application of the compressed air is in the system of interlocking switches and signals which control the movement of trains to and from the main terminal station. This system was installed by the Union Switch & Signal Co. The average number of trains handled during the day in the St. Louis Terminal Station is between 500 and 550, aggregating from 2,000 to 2,500 cars; it has been known to run as high as 750. This represents the passenger trains alone which leave and enter the station and does not include the freight traffic which passes over some of the tracks controlled by this central system. There are six entering track leads from the east and six from the west, converging into six tracks which again branch into the 32 tracks under the train shed. The total number of signals is 284; the total number of bridges is 20, and the total number of switches is 157. These figures refer to the main terminal control alone. Besides these there are probably as many more towers, switches and signals in the yards at Fourteenth street, Twenty-third street and Grand avenue.

The following figures show an example of the demands which from time to time come upon the switch and signal system. On July 14 and 15, for a period of 24 hours beginning and ending at 4 p.m., 2,203 train and engine movements were recorded at the main signal tower. These were subdivided as follows: Loaded passenger trains entering and leaving the station, 740; empty coach trains sent to the storage yards, 396; light engines, 792; switching movements, 188; freight movements, 87.

### Proposals for Pennsylvania Tunnels.

Bids are wanted March 6, by A. J. County, Secretary of the Pennsylvania, New Jersey & New York Railroad, for building tunnels under Bergen Hill, New Jersey, as advertised in the *Railroad Gazette*.

### Master Mechanics' Circular of Inquiry.

The committee of the American Railway Master Mechanics' Association appointed to make a report on the Proper Loading of Locomotives has sent out a circular of inquiry to members of the association asking them to state what in their opinion are the factors which affect the economical loading of locomotives. Replies should be sent to the chairman of the committee, C. H. Hogan, Div. Supt. M. P., New York Central, Depew, N. Y.

### Manufacturing and Business.

The Pennsylvania, it is reported, is in the market for about $600,000 worth of shop tools.

The Buckeye Jack Manufacturing Co., Louisville, Ohio, has made a shipment of its jacks to Italy.

Charles E. Webster has been appointed Chief Engineer of the Northern Construction & Improvement Co., Binghamton, N. Y., effective February 1.

In equipping its new English shops in which the steel cars for the London Underground Railway are to be built, the American Car & Foundry Company will use the Ingersoll-Sergeant Drill Company's pneumatic drills, including air compressors and Haeseler hammers and drills.

Bids are wanted February 21 by the Bureau of Supplies and Accounts, Washington, D. C., for machine tools for the navy yards at Mare Island, Cal., and Puget Sound, Wash., including a bevel band saw mill, steel plate gate shear, crank shaper, screw cutting lathe and drill press. H. T. B. Harris is Paymaster General.

George H. Hayes, formerly with the Chicago Pneumatic Tool Co., and one of the organizers of the Chicago Tool & Supply Co., has severed his connection with the latter company. He has opened a shop at 71 W. Jackson boulevard, Chicago, for developing and making special machinery and doing experimental work.

The Chicago Pneumatic Tool Company announces that it has taken over the control of the Chicago Storage Battery Company, with factory located at 1255 Michigan avenue, Chicago. Storage batteries for all purposes can be supplied, a specialty being made of batteries for train lighting and for igniting purposes for automobile, gas and gasoline engines.

The Peteler Portable Railway Mfg. Co., of Minneapolis, Minn., has been taken over by the Kilgore-Peteler Company, which also absorbs the Kilgore Machine Co., maker of Kilgore steam shovels and of sawmill machinery. Francis Peteler, President of the Peteler Company, retires, and Philip Peteler and Chas. B. Peteler continue with the new company, giving their attention to the manufacture of cars.

### Iron and Steel.

The Cincinnati, Hamilton & Dayton, it is reported, has given a contract to the Lackawanna Steel Co. for 10,000 tons of 85-lb. rails for spring delivery.

The Grand Trunk has ordered 25,000 tons of rails from the Dominion Iron & Steel Co. which will be put in operation about May 1. These rails will be rolled at Sydney, N. S.,

A new company to be known as the Birmingham Steel & Bridge Co. is to be organized at Birmingham, Ala., and, it is reported, will invest between $300,000 and $500,000 in establishing large structural iron and steel works.

The works of the Delaware River Steel Casting Co., of Chester, Pa., which was incorporated under the laws of Delaware in September, 1903, and whose real estate has been appraised at $110,000, will be sold February 16 under an order of Judge Johnson issued at Media, Pa., January 16. The receivers are Howard H. Houston and James A. G. Campbell, of the Real Estate Trust Co., Philadelphia, Pa.

## MEETINGS AND ANNOUNCEMENTS.

*(For dates of conventions and regular meetings of railroad conventions and engineering societies see advertising page 24.)*

### Franklin Institute.

At a stated meeting of the sections February 2 a paper on "Testing Cast Iron" by Dr. Richard Moldenke, Secretary American Foundrymen's Association, was read.

### Dining Car Superintendents.

The American Association of Dining Car Superintendents, at its meeting in New Orleans, January 19, elected as President for the ensuing year, Mr. A. E. White, of the Chicago, Burlington & Quincy; Vice-President, L. Y. Archibald (Intercolonial), and Secretary, F. M. Dow (Illinois Central), Chicago.

### Railway Club of Pittsburg.

At the regular meeting of this club, January 27, a paper was presented on "Four-Cylinder Balanced Compound Locomotives" by F. J. Cole, of the American Locomotive Co., Schenectady, N. Y., with illustrations.

## PERSONAL.

—Mr. Edward Hemphill Mullin died suddenly, of heart disease, January 25, at his home in Milburn, N. J. Mr. Mullin was known to many as Manager of the advertising department of the General Electric Company, with which concern he was identified for the past seven years, lacking a few days, but while he did actually direct that department he occupied in fact a position of much importance, performing for the company duties of a confidential nature. Mr. Mullin was born in Castlederg, County Tyrone, Ireland, Oct. 22, 1859, and was educated at the Methodist College, Public School of Belfast and Queen's College, Belfast, where (in 1881) he took his Bachelor's degree with honors in physics and chemistry. Early in the eighties Mr. Mullin came to New York and took up newspaper work. From 1887 to 1895 he was an editorial writer

on the staff of the New York *Evening Sun* and went from there to the New York *Times* to direct the technical reporting work of that newspaper. He later became editor of the *Bookbuyer*. Mr. Mullin was an able writer who followed good old Anglo-Saxon simplicity; his contributions to magazines and the technical press were many. He was a man of strong character with a lovable disposition. It did not take one long to learn that he struck straight from the shoulder; but in unconsciously giving this impression he was never brusque. Mr. Mullin was a thirty-second degree Mason, a member of the Engineers, Press, Lotus and Transportation Clubs, Vice-President of the New York Electrical Society, a Director of the American Institute of Electrical Engineers and Vice-President of the Association of American Advertisers.

—Mr. Thomas Miller, Freight Traffic Manager of the Chicago, Burlington & Quincy, died of pneumonia in Chicago on Tuesday, January 24. Mr. Miller was born in Saratoga, N. Y., in 1837. His early life was spent in New York City, where he learned the hardware trade. Later he became the representative in Seneca Falls, N. Y., of the New York hardware firm of Mann & Company. In 1861 he went to Burlington, Iowa, and became a member of the firm of Miller & Edger, which grew into one of the best known firms in

the west. This firm was later merged into that of Rashcoe & Company in St. Louis. Mr. Miller's railroad career dates from 1874, when he entered the service of the Burling-

ton as Traveling Auditor. Shortly afterward he was made Division Freight Agent in charge of the Iowa Division, then Assistant General Freight Agent, and in 1882 became General Freight Agent of the Burlington & Missouri River at Omaha. In 1890 he was transferred to Chicago as General Freight Agent of the Chicago, Burlington & Quincy, and in 1902 became Freight Traffic Manager of the Burlington System. Mr. Miller was a man who was thoroughly liked by all with whom he came in contact. He was widely known and popular in western traffic circles. His fine character, loyalty, and his democratic and modest nature won the warm regard of all who knew him.

—Mr. Max Riebenack, for the last 24 years Assistant Comptroller of the Pennsylvania Railroad and its controlled lines east of Pittsburg and Erie, has been appointed Comptroller, succeeding Mr. R. W. Downing, who, on

February 1, was retired on a pension under the company's age-limit rule. Mr. Riebenack is 61 years old and entered the employ of the company as a clerk at Altoona in 1863. In 1872 he was appointed Assistant Auditor of Passenger Receipts; in 1880 Auditor of Passenger Receipts, and in 1881 Assistant Comptroller, as stated above. Mr. Riebenack is one of the best known officers of the road, having been active in various enterprises outside of his principal office. He has been a prominent member of the committees and boards which have established and managed the relief department, the savings fund, and the pension department. He is Chairman of the supervisory committee of the relief department, and Secretary of the board which manages the pensions. He was for two years President of the Association of American Railway Accounting Officers, and has published numerous articles on the several branches of railroad work in which he has been engaged.

—Mr. R. E. Gaut, who on February 1 became Engineer of Bridges of the Illinois Central, has passed practically his entire railroad career with that road. He was born in Marietta, Ga., in 1870, and removed to Illinois in 1881. His first railroad experience was with the Santa Fe in 1885, but in a short time he left that road to join in United States Government land survey work in Kansas and Indian Territory, in which he remained for three years. In 1890 he en-

tered the University of Illinois, graduating in civil engineering in 1894. The following spring he entered the service of the Illinois Central as a draftsman in the bridge department and at the end of three years became Chief Draftsman. He continued in that position until last September, when he was advanced to Assistant Engineer of Bridges. With the retirement of Mr. Bainbridge, he now becomes the head of the department.

—Mr. Thomas Fitzgerald has been promoted to be General Manager of the Baltimore & Ohio to succeed Mr. Sims. Mr. Fitzgerald has been in the service of the B. &

O. 39 years and for the past five years has been General Superintendent of the Main Line and the Philadelphia Division. He was born in Fairmont, W. Va., and began his railroad career in 1866 as a water boy. From that position he rose steadily, serving as telegraph messenger boy, telegraph operator and despatcher, at various places, until he was made Master of Transportation. In 1886 he was appointed Division Superintendent and served on different divisions until he was promoted to be Superintendent of Transportation. In 1900 he was made General Superintendent of the Philadelphia and Main Stem Divisions, from which position he is now promoted to the General Managership of all the B. & O. lines. Mr. Fitzgerald is not only thoroughly acquainted with every inch of the Baltimore & Ohio property, but is very popular with the employees, two qualifications which must go far toward making his administration a success.

## ELECTIONS AND APPOINTMENTS.

*Atchison, Topeka & Santa Fe.*—J. E. Gorman, hitherto Assistant Freight Traffic Manager, has been appointed Freight Traffic Manager, succeeding W. B. Biddle, resigned. (See Chicago, Rock Island & Pacific.)

*Atchison, Topeka & Santa Fe (Coast Lines).*—I. L. Hibbard, hitherto Superintendent at San Bernardino, Cal., has been appointed General Superintendent. J. R. Hitchcock, hitherto Assistant to the General Manager, has been appointed to succeed Mr. Hibbard.

*Atlantic Coast Line.*—W. J. Haylow, Superintendent of Transportation of the First Division, has resigned.

*Baltimore & Ohio.*—T. Fitzgerald, hitherto General Superintendent at Baltimore, has been appointed General Manager, succeeding C. S. Sims, resigned. C. C. F. Bent, hitherto Superintendent of the Philadelphia Division, has been appointed to succeed Mr. Fitzgerald as General Superintendent at Baltimore, and H. B. Voorhees has been appointed to succeed Mr. Bent at Philadelphia.

*Buffalo, Rochester & Pittsburg.*—Thomas F. Brennan, hitherto General Car Agent, has been appointed Superintendent of Transportation, with headquarters at Rochester, N. Y.

*Canadian Pacific.*—S. Buchanan has been appointed Superintendent of Terminals, with office at Windsor, Ont.

*Chicago & North Western.*—B. E. Terpning has been appointed Assistant Superintendent of the Wisconsin Division, with headquarters at Chicago, Ill., succeeding P. J. O'Brien.

*Chicago, Rock Island & Pacific.*—W. B. Biddle, hitherto Freight Traffic Manager of the Atchison, Topeka & Santa Fe, has been appointed Third Vice-President of the C., R. I. & P., in charge of all traffic, effective March 1.

*Cincinnati, Hamilton & Dayton.*—F. Mertsheimer, heretofore Superintendent of Motive Power and Car Department of the Denver & Rio Grande, has been appointed Superintendent of Motive Power of the C., H. & D., succeeding Charles H. Cory.

*Cleveland, Cincinnati, Chicago & St. Louis.*—M. E. Ingalls has been elected Chairman of the Board and W. H. Newman succeeds him as President. E. V. W. Rossiter has been elected Vice-President in charge of Finances; W. C. Brown Vice-President in charge of Transportation; John Carstensen Vice-President in charge of Accounting, and G. J. Grammer Vice-President in charge of Traffic. (See Michigan Central.)

*Delaware & Hudson.*—J. W. Burdick, hitherto General Passenger Agent, has been appointed Passenger Traffic Manager. Paul Wadsworth, hitherto General Freight Agent, has been appointed Freight Traffic Manager. A. A. Heard, hitherto Assistant General Passenger Agent, has been appointed to succeed Mr. Burdick as General Passenger Agent. C. E. Rolfe, hitherto Assistant General Freight Agent, succeeds Mr. Wadsworth as General Freight

Agent. W. J. Mullin, hitherto Industrial Agent, has been appointed Assistant to the Second Vice-President. All of the above will have their offices at Albany, N. Y.

*Denver & Rio Grande.*—See Cincinnati, Hamilton & Dayton.

*Illinois Central.*—The headquarters of C. C. Cameron, General Freight Agent, have been removed from Louisville, Ky., to Memphis, Tenn. D. W. Longstreet, hitherto Assistant General Freight Agent, has been appointed General Freight Agent, at Louisville.

*Long Island.*—A. L. Langdon, hitherto General Freight Agent, has been appointed Traffic Manager, in charge of both freight and passenger traffic. L. S. Wells, hitherto Superintendent of Telegraph, has been appointed Electrical Superintendent. P. H. Woodward has been appointed Secretary to the President, effective February 1.

*Michigan Central.*—H. B. Ledyard has been elected Chairman of the Board, succeeding Mr. Depew, and W. H. Newman succeeds Mr. Ledyard as President. W. C. Brown becomes Vice-President in charge of Transportation, John Carstensen Vice-President in charge of Accounts, and G. J. Grammer Vice-President in charge of Traffic.

J. H. Snyder, hitherto Division Superintendent at Chicago, has been appointed Superintendent of Terminals at Chicago. M. B. Snow, hitherto Division Superintendent at Jackson, Mich., succeeds Mr. Snyder at Chicago, and Mr. Snow in turn is succeeded by M. P. Wright. (See Cleveland, Cincinnati, Chicago & St. Louis.)

*New York Central & Hudson River.*—President Newman and Vice-Presidents Rossiter, Brown and Carstensen have had their authority, in their respective departments, extended over the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis, which see.

See Rutland and St. Lawrence & Adirondack.

*Norfolk & Western.*—A. J. Hemphill, Secretary, has resigned.

*Pennsylvania.*—M. Riebenack, hitherto Assistant Comptroller, has been appointed Comptroller, succeeding R. W. Dowing, who retires on a pension under the age-limit.

*Rutland.*—The Board of Directors of this road since acquirement of control by the New York Central & Hudson River consists of the following: W. K. Vanderbilt, F. W. Vanderbilt, H. K. McK. Twombly, J. P. Morgan, Wm. Rockefeller, James Stillman, W. H. Newman, W. Seward Webb, Chauncey M. Depew, Olin Merrill, P. W. Clement, F. D. Proctor and Mr. Paine.

A. G. Adams, hitherto Purchasing Agent, has been appointed Treasurer.

*St. Lawrence & Adirondack.*—The Board of Directors of this road since acquirement of control by the New York Central & Hudson River consists of the following: W. K. Vanderbilt, F. W. Vanderbilt, H. K. McK. Twombly, J. P. Morgan, Wm. Rockefeller, James Stillman, W. H. Newman, W. Seward Webb, Chauncey M. Depew, Olin Merrill, P. W. Clement, F. D. Proctor and Mr. Paine.

*Wabash.*—H. W. Ashley, Assistant to the President, has resigned.

## LOCOMOTIVE BUILDING.

*The Harriman Lines* are reported to have ordered 100 locomotives.

*The Southern* has ordered 75 locomotives from the Rogers Works of the American Locomotive Co.

*The Atchison, Topeka & Santa Fe* has ordered 75 locomotives from the Baldwin Locomotive Works.

*The American Locomotive Company* is reported to have received inquiries from abroad for 125 locomotives.

*The Duluth, Missabe & Northern*, as recently reported, has ordered a total of eight locomotives from the American Locomotive Co.

*The Pennsylvania* is reported to have an option on 200 locomotives in addition to the 325 already ordered from the Baldwin Works.

*The East St. Louis Locomotive & Machine Shop Company*, as reported in another column, has received an inquiry for 100 light locomotives for April delivery in St. Petersburg.

*The New York, New Haven & Hartford* has ordered 47 passenger and 45 mogul locomotives from the Baldwin Works and 40 mogul locomotives from the American Locomotive Co.

*The Italian Cabinet Council* has recommended an expenditure of about $2,000,000 for the purchase of railroad equipment, including 10 eight-wheel and 30 six-wheel compound locomotives and 30 six-wheel tender locomotives for the Adriatic lines.

*The Duluth & Iron Range* has ordered nine, instead of five, as reported in our issue of January 27, simple consolidation (2-8-0) locomotives from the Baldwin Locomotive Works, for April delivery. These locomotives will weigh 200,000 lbs., with 170,000 lbs. on the drivers; cylinders, 22 in. x 28 in.; diameter of drivers, 54 in.; straight boiler, with a working steam pressure of 200 lbs.; 320 Shelby steel tubes 2¼ in. in diameter and 16 ft. long; steel fire-box, 108 in. long and 66 in. wide; tank capacity, 6,000 gallons, and coal capacity, 12 tons. The special equipment will include: Westinghouse air-brakes, Magnesia boiler lagging, Streeter brake shoes, Tower couplers, Nathan injectors and sight-feed lubricators, Camel journal bearings, Ashton safety valves and steam gages, Leach sanding devices and standard driving wheel tires.

*The Canadian Pacific*, as reported in our issue of December 30, has ordered 30 simple 10-wheel (4-6-0) locomotives with superheaters from the Locomotive & Machine Co., of Montreal, and 10 simple 10-wheel (4-6-0) locomotives with superheaters from the Canadian Locomotive Co., all for October and November delivery. All locomotives will weigh 190,000 lbs., with 142,000 lbs. on the drivers; cylinders, 21 in. x 28 in.; diameter of drivers, 63 in.; extended wagon top radial stayed boiler, with a working steam pressure of 200 lbs.; 248 National and 22 Mannesman tubes, 2 in. and 5 in. in diameter respectively, and 14 ft. 4 in. long; Canadian Pacific specification steel wide fire-box, 102⅛ in. x 70⅜ in.; grate area, 50 sq. ft.; tank capacity, 6,000 gallons, and coal capacity, 10 tons. The special equipment for all will include: Westinghouse-American air-brakes, Canadian Pacific specification steel axles, "Little Giant" bell ringers, Magnesia sectional block and plastic asbestos boiler lagging, Simplex brake-beams, Canadian Pacific standard brake shoes, Washburn pilot and Tower tender couplers, Pyle-National headlights, Hancock injectors, Magnus metal journal bearings, U. S. metallic piston and valve rod packings, World brand safety valves, Leach sanding devices, Richardson lubricators, Canadian Pacific standard springs, Star vertical reading dial steam gages, and Midvale open-hearth driving, truck and tender wheel tires. Other specialties are: Air signal, Star chime whistle, American Locomotive Co.'s by-pass and relief valves, Sessions' friction draft gear, Foster regulator steam valve, steel cabs and Simplex bolsters.

*The Chesapeake & Ohio*, as reported in our issue of November 11, has ordered 12 consolidation (2-8-0) locomotives and six switching (0-6-0) locomotives from the Richmond Works of the American Locomotive Co. Three simple Atlantic type (4-4-2) locomotives and two additional switching locomotives have also been ordered. The consolidation locomotives will weigh 186,500 lbs., with 167,500 lbs. on drivers; cylinders, 22 in. x 28 in.; diameter of drivers, 56 in.; wheel centers, 50 in.; extended wagon-top boiler, with a working steam pressure of 200 lbs.; total heating surface, 3,023 sq. ft.; 370 tubes, 2 in. in diameter and 14 ft. 9 in. long; fire-box, 90 in. x 75 in.; grate area, 46.87 sq. ft.; tank capacity, 6,000 gallons, and coal capacity, 10 tons. The switching locomotives will weigh 140,000 lbs.; cylinders, 20 in. x 28 in.; diameter of drivers, 56 in.; wheel centers, 50 in.; extended wagon-top boiler, with a working steam pressure of 280 lbs.; 212 tubes, 2 in. in diameter and 14 ft. 9 in. long; fire-box, 67 in. x 63 in.; tank capacity, 5,000 gallons, and coal capacity, seven tons. The Atlantic-type locomotives will weigh 173,000 lbs., with 100,000 lbs. on drivers; cylinders, 21 in. x 26 in.; diameter of drivers, 72 in.; wheel centers, 66 in.; straight boiler, with a working steam pressure of 200 lbs.; 396 tubes, 2 in. in diameter and 16 ft. long; fire-box, 96⅛ in. x 75⅝ in.; tank capacity, 6,500 gallons, and coal capacity, nine tons. The special equipment for all includes: Westinghouse air-brakes, Carnegie boiler lagging, Chesapeake & Ohio standard headlights, Leach sanding devices and Latrobe driving wheel tires.

## CAR BUILDING.

*The Detroit & Mackinac* has ordered 400 freight cars from Barney & Smith.

*The American Car & Foundry Company* reports miscellaneous orders for 120 cars.

*The Pennsylvania*, it is reported, will build 100 passenger cars at its Wilmington shops.

*The Arms Palace Horse Car Company* has ordered four coaches from Barney & Smith.

*The Seaboard Air Line* has ordered 40 stock cars from the Western Steel Car & Foundry Co.

*The Cleveland, Cincinnati, Chicago & St. Louis* denies the report that it has ordered four sleepers.

*The Louisville & Nashville*, it is reported, will build 480 box cars and 100 flat cars at its New Decatur shops.

*The Minneapolis & St. Louis* denies the report that it has ordered a number of sleeping cars and coaches.

*The Harriman Lines* are reported to have ordered 14 baggage, mail and express cars, 1,000 stock cars and 600 box cars.

*The Northern Pacific* denies the report that it has ordered 500 coal cars from the Western Steel Car & Foundry Co.

*The Chicago, Indianapolis & Louisville* has ordered one combined passenger and baggage car from the American Car & Foundry Co.

*The San Pedro, Los Angeles & Salt Lake*, as reported in our issue of January 13, has ordered 25 30-ft. cabooses from Barney & Smith.

*The Chicago, Rock Island & Pacific* will, it is reported, during 1905 order 500 coal cars, 250 Hart ballast cars and seven baggage and mail cars.

*The St. Louis & San Francisco* has ordered 54 cabooses from the American Car & Foundry Co., instead of 50, as reported in our issue of January 27.

*The Colorado & Southern* has ordered one private car from the American Car & Foundry Co. instead of a caboose, as reported in our issue of January 20.

*The Shawneetown & Rosiclare* will purchase two passenger coaches, one combination coach and express car, 50 dump cars, 30 box cars, 20 flat cars and six hand cars.

*The Cincinnati, Hamilton & Dayton-Pere Marquette System* is reported to have ordered 10 passenger coaches, three postal cars, six baggage cars and four parlor cars from Barney & Smith, for May delivery.

*The Canadian Pacific* will build at its own shops on replacement account 200 additional box cars, the same as the 3,000 already ordered, specifications for which were published in our issue of December 16.

*The Duluth & Iron Range* has ordered 500 hopper bottom ore cars of 100,000 lbs. capacity from the Standard Steel Car Co., exactly like the 300 ore cars recently ordered from the Standard Steel Car Co., specifications for which were published in our issue of Dec. 9, 1904.

*The Southern* has ordered 2,000 gondolas, 500 box cars and two mail and express cars from the American Car & Foundry Co., 1,250 box cars from the Western Steel Car & Foundry Co., and 1,250 box cars from the Mt. Vernon Car Manufacturing Co.

*The Seaboard Air Line* is asking bids on 250 pressed steel flat bottom gondola cars of 80,000 lbs. capacity. These cars will be 39 ft. 4 in. long over end sills; 9 ft. ½ in. wide over side sills, and 8 ft. ¼ in. high from rail to top of side. The special equipment will include: Westinghouse air-brakes, Tower couplers, Seaboard Air Line twin spring rigging, Symington journal boxes and arch-bar Diamond trucks.

*The W. J Rainey Coal Co.*, of Connellsville, Pa., as reported in our issue of January 27, will build 600 steel coal cars of 80,000 lbs. capacity at its Mt. Braddock shops. These cars will weigh 34,000 lbs., and measure 31 ft. long, 9 ft. 6 in. wide and 10 ft. 6 in. high. The special equipment will include: Cambria Steel Co.'s axles, bolsters and brake-beams, Sessions' brake shoes and draft rigging, Ajax brasses, Climax steel couplers and National Car Wheel Co.'s wheels.

*The Delaware, Lackawanna & Western* has ordered 75 standard ballast cars of 80,000 lbs. capacity from the Rodger Ballast Car Co. to be built by the American Car & Foundry Co., for April delivery. These cars will weigh about 32,500 lbs., and measure 34 ft. long, over end sills, 8 ft. 9 in. wide, over side sills, and 8 ft. 2¾ in. high from rail to top of side. The special equipment includes: Simplex brake-beams, Streeter steel-back brake shoes, Westinghouse automatic air-brakes, Magnus metal brasses, Janney couplers, Miner tandem draft rigging, Woodman journal boxes and lids, Sherwin-Williams Co.'s paint, Pittsburg Spring & Steel Co.'s springs and arch-bar trucks with Barber roller bearings.

*The Boston & Maine*, as reported in our issue of January 20, is building four baggage cars at its Lawrence shops to be finished in May and June. These cars will weigh 65,000 lbs., and will measure 60 ft. long, 9 ft. wide and 14 ft. 4 in. high, with wooden frames and underframes. The special equipment will include: Hammered iron axles, Composite bolsters, Central Railway Engineering Co.'s brake-beams, American Brake-Shoe & Foundry Co.'s brake-shoes, Westinghouse air-brakes, Gould couplers and platforms, Consolidated heating system, Pintsch lighting system, Pullman paint, tin roofs, Railway Steel-Spring Co.'s springs and Allen wheels.

*The Boston & Maine* is building for April delivery two blind-end six-wheel truck mail cars at its Lawrence shops, instead of one, as reported in our issue of January 20. These cars will weigh 93,800 lbs., and will measure 60 ft. long and 9 ft. wide, inside measurement, and 14 ft. 4 in. high over all. The special equipment includes: Chicago Railway Equipment Co.'s high-speed brake-beams, American Brake Shoe & Foundry Co.'s brake shoes, Westinghouse air-brakes, Gould couplers, platforms and vestibules, Pantasote curtain material, Ewart door fastenings, Consolidated heating system, Pintsch light, Railway Steel-Spring Co.'s springs, Boston & Maine standard trucks and Allen wheels.

*The Southern Pacific*, as reported in our issue of January 13, has ordered 50 chair cars and 26 coaches from the St. Louis Car Co. for delivery commencing March 1; also, as reported in our issue of December 16, it has ordered five dining cars and five observation and smoking cars from the Pullman Co. for February delivery. The chair cars will weigh about 84,800 lbs., and measure 60 ft. long, 9 ft. 8 in. wide and 14 ft. 2 in. high. The coaches will be 60 ft. long, 10 ft. ⅜ in. wide and 14 ft. $1^1/_{16}$ in. high. The dining cars will weigh about 119,000 lbs., and will measure 70 ft. long, 9 ft. 8 in. wide and 14 ft. 2 in. high. The observation and smoking cars will weigh 121,000 lbs., and will measure 72 ft. 6 in. long, 9 ft. 8 in. wide and 14 ft. 2 in. high. The special equipment for all includes: Diamond special brake-beams, Christie brake-shoes, New York air-brakes, Hewitt brasses, Janney couplers, Forsyth curtain fixtures, Pantasote curtain material, Consolidated heating system, National Malleable Castings Co's journal boxes and lids, Pintsch lights, Railway Steel-Spring Co.'s springs, Southern Pacific standard trucks, Pullman vestibules and Standard steel-tired wheels.

## BRIDGE BUILDING.

BINGHAMTON, N. Y.—Bids are wanted February 7 by D. C. Herrick, City Clerk, for repairs to the Tompkins street bridge.

CLAY CENTER, NEB.—Bids are wanted February 7 by the County Commissioners for putting up all the bridges that may be needed for one year in Clay County.

ILLINOIS.—The Lower House of Congress on Jan. 24 passed the bill authorizing the Kensington & Eastern R. R. Co. to build a bridge over the Calumet river, in Cook county, Ill.

INDIANAPOLIS, IND.—Cyrus J. Clark, County Auditor, it is reported, is asking bids February 12 for $170,000 of bridge bonds.

LOUISA, KY.—A bill was introduced in the lower house of Congress Jan. 18 authorizing the Louisa and Fort Gay Bridge Co. to build a bridge over the Tug and Louisa forks of the Big Sandy river, at Louisa, Ky.

MINNESOTA.—On Jan. 17 the United States Senate passed the bill, previously passed by the House of Representatives, authorizing a railroad bridge over the Red River of the North from Marshall County, Minn., to Walsh County, N. Dak. (Jan. 20, p. 22.)

MISSISSIPPI.—A bill authorizing Sunflower County, Miss., to build a bridge over the Sunflower river was passed last week by both Houses of Congress, the plans having been already approved by the Secretary of War.

NORTH PLATTE, NEB.—Bids, it is reported, are wanted by the Board of County Commissioners for putting up a highway bridge 3,200 ft. long and 16 ft. wide over North Platt river. F. R. Ginn is County Clerk.

OACOMA, S. DAK.—On Jan. 24 the Lower House of Congress passed a bill extending the time for commencing the construction of the bridge over the Missouri river by the Federal R. R. Co. to Jan. 8, 1906, and for the completion of the bridge to Jan. 8, 1908.

OSHKOSH, WIS.—The contract for building the superstructure of the bridge at Main street over Fox river, it is reported, has been let to the Modern Steel Structural Co., of Waukesha, Wis., at their bid of $58,673.

POLLARD, ALA.—The United States Senate on Jan. 21 passed a bill, which is also before the House of Representatives, authorizing the Lindsey Lumber Co. to build a bridge over Conecuh river, at Pollard, Escambia County, Ala.

SOUTH BEND, IND.—Bids, it is reported, are wanted by John W. Harbou, County Auditor, March 1, for $100,000 of bridge bonds.

VAN BUREN, ARK.—On Jan. 16 a bill was introduced in the lower house of Congress authorizing a bridge over the Arkansas river at or near Van Buren, Ark.

WABASH, IND.—Bids, it is reported, are being asked by the County Commissioners February 7 for building a viaduct over Charley creek in Wabash county. The plans call for a structure 240 ft. long with two 75-ft. arches for the waterway, a 24-ft. roadway and 5-ft. sidewalks on the north side. W. D. Davis is County Auditor.

### Other Structures.

CHARLOTTE, N. C.—The Southern, local reports state, has given the contract to H. C. Morrison, of Augusta, Ga., at about $49,000 for the new passenger station. With freight sheds it will cost about $60,000.

CINCINNATI, OHIO.—The Cincinnati, New Orleans & Texas Pacific has plans ready for putting up two large freight houses; an outbound house 25 ft. x 1,150 ft., and an inbound house 42 ft. x 150 ft. of brick.

CLEBURNE, TEX.—Contracts will soon be let for rebuilding the shops of the Atchison, Topeka & Santa Fe destroyed by fire. The cost of the work will be between $125,000 and $200,000.

GUNNISON, COLO.—The roundhouse of the Denver & Rio Grande at this place was destroyed by fire January 16 at a loss of about $20,000.

HARTFORD, CONN.—The New York, New Haven & Hartford, it is reported, will put up three new freight houses as follows: Outward freight house, 35 x 600 ft.; transfer shed, 60 x 800 ft., and inward freight house, 50 x 800 ft.

LOUISVILLE, KY.—The Louisville & Nashville has taken out a permit to put up an eleven-story office building of brick and stone 60 ft. x 210 ft., to cost about $300,000.

PINE BLUFF, ARK.—The St. Louis, Iron Mountain & Southern will submit a proposition to the City Council for putting up a new passenger station.

RENOVO, PA.—The locomotive repair and machine shops of the Pennsylvania at this place, it is reported, will be improved at a cost of about $150,000.

ROCKLAND, ME.—The Maine Central, it is reported, will build a new freight house at this place.

SIOUX CITY, IOWA.—The Chicago, St. Paul, Minneapolis & Omaha has completed plans for spending $80,000 in improving its shops and increasing its roundhouse from 15 to 40 stalls.

## RAILROAD CONSTRUCTION.

### New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—The purposes of the $50,000,000 bond issue have been announced. One hundred and fifty-five miles of second track will be built, including the completion of the double track between Chicago and Streator, Ill., and new second track east and west of Marcelene, Iowa. The cut-off between Holliday, Kan., and Emporia will be double tracked, the seven-mile freight yard in Argentine, Kan., will be completed, and a 1,500,000-bushel elevator will be built at Argentine at an estimated cost of $400,000. The cut-off between Texico, on the Pecos Valley line, and the main line west of Albuquerque will also be completed.

BIG HORN (C., B. & Q.).—This company, which has just been incorporated in Wyoming, has let the first contract for the building of its line to the Shoshone reservation to Bishop J. Jolly, of Basin, Wyoming. The road is to run from Frannie, on the Toluca-Cody branch of the Chicago, Burlington & Quincy, across the Shoshone river at Lovell and thence through Ribbon Canyon and along the Big Horn river to Thermopolis.

CHICAGO, WEATHERFORD & BRAZOS VALLEY.—A survey is reported being made for this road, which is to run from Weatherford, Tex., north to Bridgeport, 36 miles. George M. Bowie, of Weatherford, is interested.

CHICAGO & STATE LINE (C. & N. W.).—This company has been incorporated in Illinois with a capital of $10,000 by officers of the Chicago & North Western to build from a connection with the Chicago & North Western at Lake Bluff, Ill., to the Wisconsin state line.

CINCINNATI & MILFORD TRACTION.—This road, which now extends from Madisonville, Ohio, to Milford, 10 miles, will, it is said, shortly be extended northeast to Blanchester, 30 miles.

CINCINNATI, TOLEDO & COLUMBUS TRACTION.—It is reported that this road will be built

from Toledo, Ohio, southwest to Lima, 70 miles, paralleling the Cincinnati, Hamilton & Dayton, thence south and east via Roundhead and Indian Creek to Bellefontaine, Marysville and Columbus.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Extensive improvements are nearly completed between Lawrenceburg Junction, Ind., and Greensburg. Seventy-five curves are to be taken out and the total curvature is to be reduced from 2,300 to 700 deg., leaving but 14 curves on the 41 miles of line. Seventy thousand yards of concrete have been required for the work, and in three cuts averaging 83 ft. deep, 200,000 yards of earth have been removed.

COLORADO ROADS.—A franchise has been granted to build an electric line about 100 miles long through Delta County, Colo. W. B. Stockham and C. L. Pike, of Delta, are interested.

CONSOLIDATED RAILWAY (N. Y., N. H. & H.).—Application has been made to the legislature for permission to build a new trolley line between Wallingford, Conn., and Meriden.

DEEPWATER RAILROAD.—An officer writes that 85 miles of this road is now under contract, on 60 miles of which grading is under way; and that 15 miles of track has been laid with 85-lb. rails. The projected line begins at Deepwater, W. Va., on the Chesapeake & Ohio, and runs south through the counties of Fayette, Raleigh, Wyoming and Mercer via Princeton to the Virginia state line near the junction of the East and New rivers. At the state line, it is to connect with the projected Tidewater Railway, which is surveyed from that point to Hampton Roads. The work is very heavy, with numerous steel bridges and trestles and eight tunnels. The maximum curves are 10 deg. William N. Page, Ansted, W. Va., is Chief Engineer.

DELAWARE & HUDSON.—It is reported that surveys have been begun for a line from Mechanicville, N. Y., southeast across Renssalaer and the northeast corner of Columbia counties, 40 miles, to State Line, Berkshire county, Mass., on the Boston & Albany and the terminus of a branch of the New York, New Haven & Hartford.

The contract for building a branch from Thurman, N. Y., on the North Creek branch of the Adirondack division, east to Warrensburg, three miles, is reported to have been let. The work is to be completed by July 1.

DENVER & RIO GRANDE.—It is reported that this company's engineers are surveying a line between Durango, Colo., and Farmington, N. Mex.

DOUGLAS, AUGUSTA & GULF.—An officer writes that this road, formerly the Wadley & Mt. Vernon Extension, is now in operation from Nashville, Ga., northeast to Barrows Bluff. An extension is planned from Barrows Bluff north via McRae and Helena to Rockledge, on the Wadley & Mt. Vernon, which runs from Rockledge northeast to Wadley, 40 miles.

FOREST PARK (ELECTRIC).—It is announced that this company, which is building two miles of road in Troy, N. Y., will extend its line so as to connect with the Hudson Valley on the north and the Albany & Hudson on the south. The proposed line would connect Troy and Rensselaer.

GALVESTON, HOUSTON & HENDERSON.—Press reports state that a six-mile extension from Ladysmith City, Tex., to Seabrook will be built.

GRINNELL INTERURBAN (ELECTRIC).—This company was incorporated in Iowa January 25 with a capital stock of $10,000. It proposes to build from Grinnell northwest to Tama, Belleplaine and Vinton, and ultimately to Independence, the county seat of Buchanan County. O. K. Cole and J. P. Lyman, of Grinnell, are among the incorporators.

HOLLY RIVER & ADDISON.—It is reported that this road, which is now in operation from Holly Junction, W. Va., on the Baltimore & Ohio southeast to Webster Springs, 30 miles, is about to be extended from Webster Springs to Bergoo, W. Va., eight miles. J. T. McGraw, Grafton, W. Va., is President, and George A. Hechmer, Palmer, W. Va., Secretary and General Manager.

KANSAS, OKLAHOMA & POTEAU.—This company has been incorporated with a capital stock of $10,000,000 in Oklahoma Territory with J. W. McNeal and Luther West, of Guthrie, Okla. T., and Frank M. Daly, of Nevada, Mo., among the incorporators. It is proposed to build a road from Guthrie east through Logan, Lincoln and Payne counties to Wagoner, Ind. T., and another line from a point near the Kansas state line in the northwesterly part of the Osage nation through Pawnee County, Okla. T., and the Creek nation, by way of an intersection with the first-mentioned line, to Poteau, Ind. T.

KANSAS, OKLAHOMA, TEXAS & GULF.—This company has been incorporated in Oklahoma Territory with a capital stock of $10,000,000 to build a road from Coffeyville, Kan., southwest through the Cherokee and Osage nations and Pawnee, Payne, Logan, Kiowa and Greer counties, Okla. T., to a point on the Fort Worth & Denver City, in the southwestern part of Collingsworth county, Tex. James H. Hunter and W. E. Minton, of Kansas City, and Thomas L. Eggleston, of Granite, Okla. T., are among the incorporators. (See Kansas, Oklahoma & Gulf, Construction Supplement.)

LIVE OAK & SUWANEE SPRINGS.—This company has been chartered in Florida with a capital stock of $20,000 to build six miles of road. The general offices are at Live Oak, and among the incorporators, F. L. Rey and B. W. Helvenston.

MIDLAND VALLEY.—On January 23 an amendment to the charter was filed increasing the authorized capital of the company from $5,000,000 to $9,000,000 and providing for extensions, including one from Bowles, Ind. T., through Caddo County to the southern boundary of Montgomery County, Ark., 55 miles, estimated to cost $20,000 per mile. The road runs at present from Howe, Ind. T., northwest to Muskogee, with an extension reported under way from the latter point northwest to Tulsa, 54 miles.

MISSISSIPPI ROADS.—It is reported that a road will be built from Moss Point, Miss., on a branch of the Louisville & Nashville, north to Lucedale, on the Mobile, Jackson & Kansas City, 35 miles, by W. Denny & Co., lumber manufacturers, of Moss Point, who have let the contract for the first 15 miles.

NEW YORK, NEW HAVEN & HARTFORD.—This company is reported to be making surveys over the route of the old Ridgefield & New York Railroad with the purpose of building from some point in the vicinity of Greenwich, Conn., up the valley of the Mianus river through Northcastle and Bedford, N. Y., to Ridgefield and Danbury, Conn.

OREGON TRACTION.—It is proposed to build a line from Portland, Ore., east to Forest Grove, 26 miles.

OTTAWA RIVER.—This company has awarded to M. P. McGrath, of Easton, Pa., the contract for building its line between Montreal and Ottawa, 100 miles. It is planned to build ultimately to Georgian Bay. (April 29, p. 336.)

OVERTON COUNTY.—An officer confirms the report that construction will be begun early in the spring from a point on the Tennessee Central in Putnam County, Tenn., northeast to Livingston, 17 miles. It is proposed ultimately to extend this line through Pickett County, Tenn., to the Cincinnati Southern, about 68 miles. Justis Cox, Jr., & Co., Philadelphia, are the general contractors for the entire work, none of which is difficult. B. Armitage, Philadelphia, Pa., is Chief Engineer, and E. C. Knight, Livingston, Tenn., General Counsel and Treasurer. (January 20, p. 23.)

PRESCOTT & NORTHWESTERN.—This road, which now runs from Prescott, Arkansas, northwest to Tokie, 33 miles, will, it is reported, be extended eight miles from Tokie. W. N. Bemis, Prescott, is President.

PORTLAND SOUTHERN (ELECTRIC).—It is reported that this company will build from Portland, Ore., south to Salem, 52 miles.

RICHMOND & CHESAPEAKE BAY.—This company has been incorporated in Virginia with Frank J. Gould as President and Guy Phillips, Secretary and Treasurer, to build a line of railroad, to be operated either by steam or electricity, from Richmond to Ashland and thence to Chesapeake Bay at some point in Northumberland or Lancaster counties, and another line from Richmond to a point on Chesapeake Bay in Gloucester, Matthews or Middlesex counties. The incorporation of this company was delayed until a decision of the Virginia Supreme Court was given granting the right to parallel part of the Richmond, Fredericksburg & Potomac.

RIO GRANDE, SIERRA MADRE & PACIFIC.—This road, which is the property of W. C. Green and runs from El Paso, Tex., southwest to Terrazas, State of Chihuahua, Mexico, 150 miles, has begun an extension from Terrazas southwest to the new town of Dedrick at the junction of the Arros and Chico rivers, 120 miles.

ROGUE RIVER VALLEY.—This road, which is in operation from Jacksonville, Ore., east to Medford on the Southern Pacific, six miles, will, it is reported, be soon extended from Medford northeast to Prospect, 40 miles.

RUSSELL'S ISLAND & DEEP LAKE.—This company has been incorporated in Florida to build a road from Deep Lake, Lee County, to the Gulf of Mexico, near Russell's Island, about 12 miles. The incorporators are: Henry C. Butcher, Jr., H. Radcliffe Roberts and Walter G. Langford.

ST. LOUIS, BROWNSVILLE & MEXICO.—An officer is quoted as saying that this road will be extended from Brownsville, Tex., across the Rio Grande river southward to Tampico, Mex., 290 miles. This line, if built, would shorten the distance between Galveston and central Mexican points 285 miles.

TEMISKAMING & NORTHERN ONTARIO.—The Ontario Government has taken over from the contractors this new government road, which runs from North Bay to New Liskeard. On the extension from New Liskeard north to a connection with the projected Grand Trunk Pacific, the line has been located for 65 miles and graded for about 45 miles, and rails have been laid for 22 miles.

TENNESSEE CENTRAL.—It is reported that track laying on the branch from the main line to the mines at Ozone, Tenn., three miles, will be begun at once. W. J. Oliver & Co., of Knoxville, are the contractors.

VANCOUVER, VICTORIA & EASTERN.—An extension from Midway, B. C., to Orville, Wash., has been surveyed. J. H. Kennedy, Grand Forks, B. C., is Chief Engineer.

WESTERN OF ALABAMA.—It is reported that this company will build and has secured rights of way for a line from Millstead or Tallahassee into Coosa and Elmore counties, Ala., about 40 miles.

## RAILROAD CORPORATION NEWS.

ALASKA CENTRAL.—A syndicate headed by A. C. Frost & Co., of Chicago, and Henry C. Osborn, of Toronto, has gained control of this company. A. C. Frost, of Chicago, has been elected President, and W. B. Poland, of Seattle, General Manager and Chief Engineer. The road is protected from Seward, on Resurrection bay, Alaska, north to the Tanana river, about 425 miles, with a branch 30 miles to the Metamuska coal fields. The docks and terminals at Seward have been built, and rails are reported laid on 30 miles of the road.

ATCHISON, TOPEKA & SANTA FE.—The stockholders will be offered the privilege of subscribing at par to the new bonds to the extent of 15 per cent. of their holdings.

If all exercise their option this will require about $32,000,000 of the issue of $50,000,000 recently authorized. This amount of bonds will be underwritten by J. P. Morgan & Co. and Kuhn, Loeb & Co.

Baltimore, Chesapeake & Atlantic.—The stockholders, on January 26, voted to guarantee the bonds of the Maryland, Delaware & Virginia Railway, the successor, at foreclosure sale, of the Queen Anne's Railway. This action is taken in consideration of the delivery to the Baltimore, Chesapeake & Atlantic of a majority of the $3,000,000 capital stock of the new company.

British Columbia (Electric).—An agreement is reported to have been made between this company and the Canadian Pacific by which the electric road will operate under electric power the Lulu Island branch of the Canadian Pacific between Victoria, B. C., and Steviston, on the Fraser river.

Camden Interstate (Electric).—A press despatch from Parkersburg, W. Va., states that this company's property has been taken possession of by the United States Marshal under a judgment for $10,000.

Central Pacific.—Application has been made to the New York Stock Exchange to list $8,300,000 Through Short Line first-mortgage guaranteed 4 per cent. bonds of 1954.

Chicago, Rock Island & Pacific.—According to a statement recently given to the New York Stock Exchange the Rock Island owns $18,790,000 of the stock, largely common, of the Chicago & Alton. On account of this, $10,000,000 refunding 4 per cent. bonds of 1934 have been issued. The New York Stock Exchange has given permission to list $15,154,000 of this issue of bonds, with authority to list an additional $10,404,000 before July 1 next. The total issue is $40,000,000, of which $32,528,548 is to be for new acquisitions and construction and completion of new roads. This amount is a direct first lien on 600 miles of road, a collateral lien (through a pledge of the entire issue of bonds and stock) on 396 miles of road, and a collateral lien (through a pledge of the entire issue of bonds) on 151 miles of road.

Cincinnati, Dayton & Toledo Traction.—The stockholders have approved the lease of this company's lines to the newly incorporated Cincinnati & Northern Traction Co., which is authorized to operate lines through 18 counties, with terminals at Toledo and Cincinnati, Ohio.

Colorado & Southern.—The trustees have voted to dissolve the voting trust. New certificates of stock will be ready about April 1 for exchange for voting trust certificates.

Consolidated Railway (N. Y., N. H. & H.)—Under the terms of the purchase of the Berkshire Street Railway, each stockholder of the Berkshire Co. may exchange his stock for 25-year consolidated gold coupon bonds of the Consolidated Railway Co. at par. These bonds will be dated Feb. 1, 1905, and bear interest as follows: Three per cent. for five years, 3½ per cent. for five years and 4 per cent. for 15 years. Such exchange must be made on or before March 15.

El Paso & Rock Island.—Hartshorne, Bogert & Battelle and McKinnell, Coffin & Rawlins, of New York, offer at 101½ and interest $200,000 first mortgage 5 per cent. gold coupon bonds of this company, due January, 1951, guaranteed by the New Mexico Railway & Coal Co. The El Paso & Rock Island extends from Carrizozo, N. Mex., the northern terminus of the El Paso & Northeastern, northeast to Santa Rosa, 131 miles, where it connects with the Chicago, Rock Island & Pacific, thus forming part of the latter company's line to El Paso.

Fitchburg (Boston & Maine).—Application has been made to the Massachusetts Railroad Commission for authority to issue $3,660,000 twenty-year 4 per cent. bonds, $2,660,000 in place of bonds already authorized and $1,000,000 for refunding and permanent improvements.

Fountain Head Railroad.—This road, which is 5½ miles long and runs from Knoxville, Tenn., to Fountain City, was sold at public auction February 1.

Mansfield & Shelby Short Line.—The right of way, franchises and road bed of this project for a road between Mansfield and Shelby, Ohio, 10 miles, abandoned for some time, will be sold at foreclosure sale February 11.

Michigan Central.—The lease of that part of the Detroit, Toledo & Milwaukee from Homer, Mich., northwest to Allegan, 68 miles, by the Michigan Central, was effective February 1, and this section will be known as the Allegan division of the Michigan Central. The Lake Shore, which has heretofore leased the whole line of the Detroit, Toledo & Milwaukee, will continue to operate the portion of that road between Dundee and Homer.

Minneapolis, St. Paul & Sault Ste. Marie.—This company has applied to the New York Stock Exchange to list $3,000,000 general first consolidated mortgage 4 per cent. bonds of 1938.

New York Central & Hudson River.—It is announced that the Western Transit Co., the New York Central's lake line of steamers, has bought the Rutland Transit line, running from Ogdensburg, N. Y., to Milwaukee and Chicago.

New York, Ontario & Western.—A dividend of 3 per cent. has been declared on the outstanding $58,113,982 capital stock of this company. This is the first dividend which has ever been paid on the stock. A good share of the total payment of $1,743,176 went to the New York, New Haven & Hartford, owner of a large majority of the stock.

Application has been made to the New York Stock Exchange to list $2,063,000 additional refunding-mortgage 4 per cent. bonds of 1992.

The December report of this company shows gross earnings for the six months ended Dec. 31, 1904, of $3,659,468, against $3,466,634 for the same period in 1903. Net earnings for the same period are, $1,155,993, as against $859,818 in 1903.

North Atlantic City.—This company has been incorporated in New Jersey with an authorized capital of $210,000 to reorganize and merge the Philadelphia & Brigantine, a steam road from Brigantine Junction to Brigantine Beach, N. J., 14 miles, now out of operation and in the hands of a receiver, and the Brigantine Transportation Co., an electric line 6½ miles long in Brigantine, N. J.

Ohio River & Western.—J. K. Geddes, General Manager, was appointed receiver on January 25 in the United States Court at Wheeling, W. Va., on the application of the Farmers' Loan & Trust Co. It is said that interest on the bonds of this company has been in default since August, 1903.

Panama Railroad.—The United States Government, which owns 98½ per cent. of the $7,000,000 capital stock of this road, has authorized William Nelson Cromwell to offer par for the minority shares. Assenting minority stockholders may deposit their certificates until February 23 at the Bankers' Trust Co., New York, in exchange for cash. Since this announcement a dividend of 5 per cent., which belongs to assenting stockholders, has been declared. The last dividend, in May, 1904, was 2½ per cent.

Philadelphia & Reading.—The report of the Reading Co. for December, 1904, shows an increase in net earnings of the Philadelphia & Reading Railway for the half year from July 1 of $1,786,568 over the same period last year. The net earnings of all companies for the six months amounted to $10,574,385, an increase of $1,528,894 over 1903. The surplus for the half year is $5,381,385, an increase of $1,647,478 over the surplus for the same period in 1903.

Seaboard Air Line.—John Skelton Williams, one of the voting trustees, has issued a statement outlining a plan for the reorganization of the company in opposition to the Blair-Ryan plan. He proposes no assessment of the stockholders and says that a syndicate of his acquaintances is willing to furnish the company with all the money required on the following conditions: (1) The consolidation of the Seaboard Air Line, Seaboard & Roanoke and Atlanta & Birmingham, and the ultimate issue of not more than $15,000,000 or $18,000,000 of first preferred stock. (2) The exchange of the present preferred stock, share for share, for new second preferred, and the present common, share for share, for new common. (3) The sale of $5,000,000 new first-preferred stock, to be underwritten at 87½, with a commission of 2½ per cent., all stockholders to be given the right to subscribe pro rata and receive the commission. (4) The representation of the syndicate which furnishes the funds in the management of the property, by the appointment of one-half the voting trustees if the syndicate subscribes half the amount necessary, and of a majority of the trustees and directors if it subscribes all the money.

Sierra Railway.—This road, which runs from a junction with the Atchison, Topeka & Santa Fe at Oakdale, Cal., through Calaveras, Sanislaus and Tuolumnecas counties to Sonora and Angels, 100 miles, has, it is reported, been bought by the Atchison, Topeka & Santa Fe.

St. Louis, Iron Mountain & Southern.—The unifying and refunding bonds recently listed by this company were issued for the following purposes: $217,000 in exchange for $200,000 first-mortgage 7 per cent. bonds of the Baring Cross Bridge Co.; $2,567,000 in exchange for $2,332,500 of the first mortgage bonds of the Little Rock & Fort Smith due Jan. 1, 1905. The River & Gulf division bonds were issued for the following purposes: $1,930,000 as reimbursement for expenditures made in building extensions of the road, formerly belonging to the White River Valley Co.

St. Catharines, Niagara & Toronto (Electric).—The firm of MacKenzie & Mann, which owns the Canadian Northern, has bought this road, which runs from Niagara Falls to Port Dalhousie. It is proposed to extend the line and connect with other electric roads so as to reach Hamilton, Ont., and Toronto.

Texas & New Orleans.—A bill has been introduced in the Texas legislature authorizing this company to sell that part of its line extending from Sabine Pass, on the Gulf of Mexico, northwest to Dallas, 280 miles. This action is taken because of the objections of the Railroad Commission to the Southern Pacific's control of parallel lines between these points through its ownership of the Houston & Texas Central, the Houston, East & West Texas and the Texas & New Orleans.

Toledo, Urban & Interurban.—This company, which is building a line from Maumee, Ohio, into Toledo, has leased the Toledo, Bowling Green & Soutnern Traction Co. The latter line runs from Findlay to Perrysburg, 56 miles, and has lately completed an extension from Perrysburg into Toledo.

Western Maryland.—A settlement has been made with the Baltimore & Ohio by which the Western Maryland has secured the right to cross the Chesapeake & Ohio canal. Under the terms of the agreement, the Western Maryland pays $500,000 for 18 strips of canal land in Washington County and 24 in Allegheny County, covering about 140 acres, to be used for the crossings, and 60 or 70 acres of land for other purposes.